

MOTOR AGE

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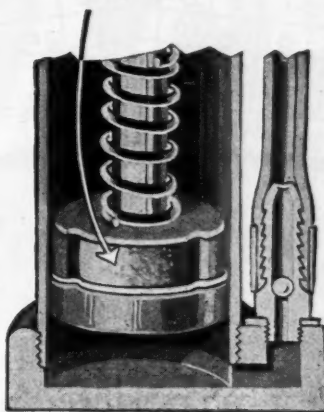
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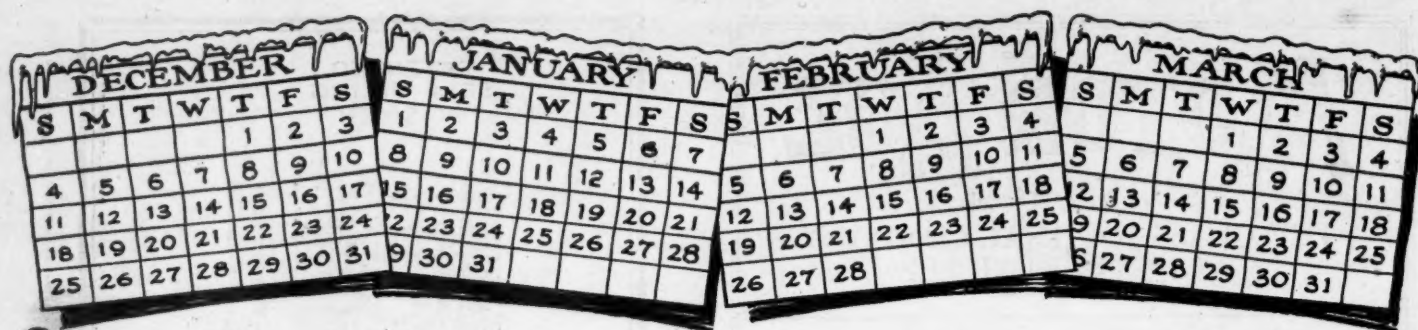
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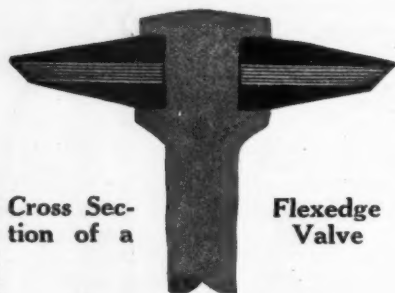
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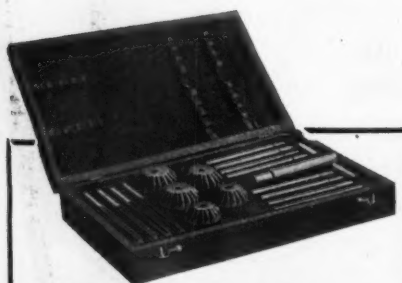
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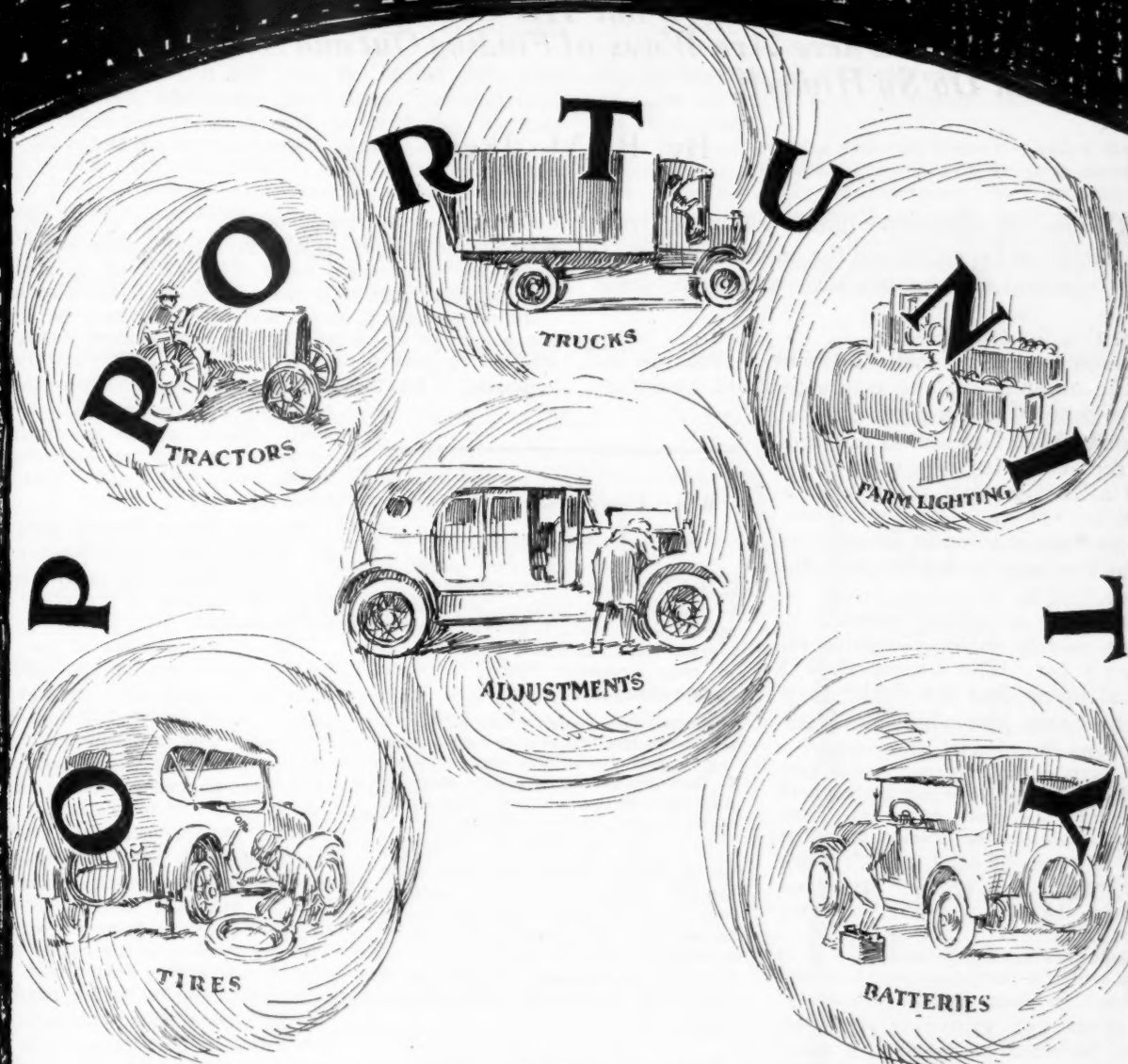


Self-Seating Valve Co.

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Chicago, Ill.

MOTOR AGE



EVERY time the dealer sells a car, he is presented with the opportunity to service that car from the day of the sale until the car is ready for the scrap pile. The same is true of the tractor or truck.

Even if he has not sold all the cars in his territory, there still remains the opportunity of servicing these vehicles.

Maintenance work is essential on every car, truck or tractor, and if there are 300 cars of a certain make in a territory, the dealer handling that make of car is in a position to get the service work on every one of them. Opportunity is all around him. But unless his equipment and service methods are such that he can grasp these opportunities, the dealer will fall short and his place will be looked upon as "just another garage."

Where Does Your Service Stand?

HOW Is the Dealer to Know Whether His Customers Come Into the Service Willingly or Unwillingly? How Is He to Know What His Customers Think of His Service? There Are Ways of Finding Out and Any Dealer Can Do So Himself

By B. M. Ikert

EVERY time the automotive dealer sells a car, truck or a tractor, he expects to sell the purchasers of these the service and maintenance such vehicles naturally demand.

He does this for two reasons.

One reason is that he wants to make a profit on the work. The other is that he wants to build up future sales. He knows that in time cars or other automotive vehicles wear out and must be replaced with new ones.

Repeat sales are what the dealer is after, and the volume of business done along these lines is often in direct proportion to the way in which he sells his service.

The business of selling service is more than merely making repairs on the owner's car. The owner should be checked up so that the dealer may know at all times just where his business relations stand with the owner.

Ask, for example, the average dealer how many of the customers to whom he has sold cars come into his place of business for service and maintenance work. Most of them will tell you, "I don't know." Some might say, "About half of 'em." In a few isolated cases the answer might be, "Sixty per cent of them."

Show managers are much concerned as to the way in which a performance takes with an audience. It means money to them. If the play is not well written or presented, and if the personnel is lacking in many ways, the critics will soon find it out and so will the audience. From then on the show draws but a meager crowd.

Now take the dealer's business. Is the average dealer concerned as to whether or not his service is taking with his customers? Does it not mean money to him? If his service is poorly rendered, or his personnel lacking, the critics—his customers—soon will find it out and so will other people in his community. And, from then on, his service station draws but meager crowds.

Too few dealers know enough about the relationship existing between them and those to whom they have sold cars. The dissatisfied customer can build up a tremendous resistance of which the dealer is not aware. There is grave danger to the dealer's business when a customer, in speaking to a friend, says, "Yes, I bought a Blank car, but believe me I'll never get

another; their service is rotten." This is one of the most common statements made today about automobiles, and it is something with which many a dealer must do some serious figuring if he expects to keep his place in the parade.

But how might a dealer find out just where he stands with the people to whom he has sold cars? How might he know whether he gets all the service work in the territory logically belonging to him? And, how might he know why some people come to his service station regularly, while others never show up? Easy enough, providing he has some records, which go with any well-conducted business.

In other words, we are assuming that the dealer's service station has been run on such a basis that it will be possible to get the records of every job done, say, during a year.

Next to the records of the jobs done in the service station the dealer should have the records of new and used car sales. These will be of immense value. Still more valuable will be a list of the owners of the particular car for which the dealer is agent, whether he made the original sales of these cars or not.

After he has obtained these records, the only other things necessary are a good-sized sheet of paper and a pencil. Let the sheet be marked off according to the suggested form shown herewith. The chart contains the names of the people to whom the dealer has sold cars, the months during which they called at the service station, the nature of the work done, and at the extreme righthand side is the total number of visits made by each person.

As a further suggestion, it might be well in jotting down the nature of the work done to assign various colors for various jobs. Thus, all valve work might be designated by a red pencil; axle work, blue, clutch and gearset, green, etc. This would spot up the chart so that certain conclusions could be drawn, should any one color predominate. Thus, if blue predominated it might indicate that the rear axle on that particular make of car needed considerable maintenance work.

If possible, the speedometer reading on the car when the last job was performed should be put in on the chart. The value of this lies in the fact that the dealer can ascertain the number of visits per car, as regards the miles traveled. He knows, for instance, that Jones came to his place once during 13,000 miles of car travel, while Smith, who bought his car at

Who Gets the Other 50 Per Cent?

SOME recent investigations into the status of business with motor car dealers, especially as regards their service work, disclosed the fact that in most instances there "is some work coming in."

Naturally, no one who operates a service station objects to work coming in, but the strange part of it all is that dealers do not take steps to find out why certain work that ought to be coming in does not do so.

If you are the dealer in a territory for the Blank car and you know there are 358 of those cars in that territory, how many of them would you expect to service. All of them, theoretically, at least. But do you?

If you service only 50 per cent of them, who services the other 50 per cent?

the same time Jones did, has come in seven times during 10,000 miles. Hasn't Jones perhaps gone to some other place for his service work? Probably he has, because it seems logical that during 13,000 miles of travel, a car needs maintenance work of some kind.

INTERESTING FACTS DISCLOSED BY CHART

After the dealer has made up the chart according to the suggestion, he will find out some interesting facts. He may have been believing all the time that he was getting the service work from most of the people to whom he had sold cars, whereas the chart shows otherwise. He may have seen Jones in the service station just once and taken it for granted that Jones is a steady customer; but the time he happened to see Jones may have been his only and farewell visit. The chart shows the farewell visits of men like Jones.

The chart will give the dealer a sort of bird's eye view of his business for over as long a period as the chart covers. The chart tells many a story.

Some of the names on it will have the spaces after them completely filled out, which may point to the fact that these people know little or nothing about cars and in their helplessness seek the aid of the service station. Again, it may indicate that these people have been properly sold on the service and drive in for frequent inspection, installation of some accessory, or for some other good reason.

But the spaces that are filled out should not worry the dealer nearly so much as those which are blank. The blank spaces tell a sad story, many of them. The names that have a long

line of blanks after them may indicate that such owners are good mechanics and do much or all of their own repair work. Again, it might show that these people have exceptionally good luck with their cars and do not need the aid of the service station. But the likely meaning of the blank spaces is that these owners are going somewhere else for their service.

It is not a difficult thing to figure out. The cars which any dealer sells—cars of the same make—are pretty much alike and will require about the same amount of service. The same things will happen to all of them in the long run. Valves must be reground and the steering gear parts rebushed at some time; springs will break and the body finish will lose its lustre in time. Someone is going to do all this work. Why not the dealer who sold these cars in the first place and who represents that particular make of car in that territory?

The work this winter is going to be lean in many sections of the country, but perhaps by going after the blank spaces on the chart, the dealer's service station can be assured of enough work to keep the wheels turning. The job of making out the chart is not a difficult one and, once made, it will be of value for a long time. It affords something tangible upon which to work.

As long as you can find out from the chart the names of those people who should be coming to your service station, you can take steps to win them over. You may note that John Smith was a pretty steady customer until May and then he dropped out of sight. Find out if he has moved from the territory, died, or is going somewhere else for his service. Find out the reason of the sudden appearance of the blank spaces

A Chart Which Will Help You Ascertain the Standing of Your Service

NAME.	January	February	March	April	May	June		December	Speedometer Reading	Total Calls
Abbott A. H.			Valves Tighten chassis	Drain Crank case	Rebush steering gear	New Battery		Winter top and heater	8,940	8
Ackley W. E.	Able Adjusting Rebush Torque Arm	Drain Crank case Tighten chassis	Brake adjustment New Fender	Drain crank case Adjust clutch	Clean Fuel line			Brake adjustment Grind valves	5,060	19
Anderson H. K.				Clean Carbon and adjust Valve Tune Engine					12,800	1
Brown B. M.	Grind valves Tune Engine Rebush brakes		Oil and Grease chassis. Drain oil. New piston crank case	Reground cylin- der. New piston and rings Adjust clutch		New coil charge Battery.			16,000	7
Bucklin F. B.		Car Inspection New Lamps Adjust carburetor							550	1
Gatlin W. W.		New timing gears. Adjust valves	Car Inspection Drain crank- case. Oil chassis	Install spot- light Clean commutator	New Fender support Torque Arm springs	Replace spring shackle Bolts Grease springs		Repack Pump Grind Valves Adjust brakes	8,740	22
Grothers C. B.				Adjust main and connecting rod bearings Tighten chassis	Repair Radiator Adjust clutch				21,000	2
Luntley O. L.	Loosen front wheel. New universal. Repair Hood.	Adjust brakes Clean points	Blow out Fuel line	Adjust valves Abruse body squeaks	Tighten chassis Drain crank case			Remove Carbon New Battery Install ammeter	9,540	14
Eduack										

A chart made up along these lines shows the names of owners to whom the dealer has sold cars and the number of times they have been in the service station. The nature of the work done is given, the reading of the speedometer at the last visit and the total number of calls is listed in the last column. The blank spaces tell

the story. For instance, note that H. K. Anderson came into the service station but once, and yet at that time his car had been driven over 12,000 miles. Has he an exceptionally good car, or is he going somewhere else for service? Probably the latter. The chart helps the dealer to solve some of these problems.

behind his name. Was he overcharged? Is he sore? Was his car promised for a week-end trip to Hales Corners and didn't the shop get it out until Monday morning?

Anyway, find out why the sudden change in Smith's tactics. If he knows that you are interested in his case, the chances are ten to one he will warm up to you again; but if he is allowed to think you do not care for his business, he is building up resistance to your entire institution for as long a time as you let him go unheeded.

CHART VALUABLE IN MANY WAYS

The chart is valuable in many ways. Not only would the dealer know that John Smith stayed away from his service station because he found a small shop close to his home doing good work, and that Jones held a grudge against the service station because of an overcharge on some work previously done, but he could take steps to see that the things which caused these conditions were changed.

The chart furnishes food for thought. It will help the dealer in many other instances. He can plot curves from it to show what particular service operation leads in the number of times it was performed in the shop. Then, having found this particular operation, the service station can develop ways and means for speeding up that job.

Probably the investigation work after the chart has been made will reveal the fact that many of your customers who are women do not care to come to your service station because it is not clean and has no provision for their comfort while waiting for their cars. Again, perhaps one of your mechanics seated himself in a woman's sedan while he was clad in greasy overalls, much to her dislike. She has every right in the world to be provoked at the service station which permits such a thing.

The dealer will know exactly where his service stands if he makes a chart. He will not have to wonder why so and

so does not come near his place. And if his customers have been mistreated in any way, he will be able to trace the cause and pin the proceedings on someone in the organization. Thus the chart will be of value in finding the weak spot in the organization. If a mechanic blundered, the records will show who did the job and the matter can be taken up with him.

Some owner when you investigate his string of blank spaces may tell you he has gone to a shop around the corner because it is well equipped with machinery and tools to turn out work more quickly. This may be a hint for you that your shop must be better equipped and operated.

There always will be those car owners who think they can do their own repairing better than "those fellows down at the garage." Maybe they can. We believe it would not take much to equal or surpass the work of the usual garage mechanic. But, be that as it may, the dealer should convince every owner of the car he sells that his is the place to which the job of maintenance work on that car logically belongs. Let them know that automotive maintenance work is a highly specialized form of machine work and that your shop is equipped and operated on that basis.

CAN YOU GET 40 PER CENT?

It might be well to make a second chart containing the names of owners of the same make of car as the dealer handles, but who did not buy the car from him.

A Nash car is a Nash and a Buick is a Buick, so why should not a dealer's service station do the maintenance work on cars of the same make, regardless of who sold the car? Comb your county sometime and see how many cars there are in it of the make you sell and service. Then see how many of these actually come into your service station. If you get 40 per cent of them, consider yourself lucky. A chart properly made out and followed up may boost the percentage materially.

Clean Walls and Orderly Arrangement Welcome Car Owners to This Garage

CLEANLINESS about the garage or shop is one of the greatest drawing influences that can be brought to bear on customers. Some garage owners will maintain it is impossible to be had in the face of the conditions of this work, but W. J. Hamilton and F. E. Gause, proprietors of the El Camino Real Garage, King City, Calif., have a garage that rivals a department store for cleanliness and the manner of showing its merchandise.

Above this garage the two partners have built living apartments, thus saving themselves considerable rent money. The neat stucco front is attractive, having an entrance at the right and an exit at the left with show windows in between. Back of the showroom into

which the show windows and center doors open, is the office.

Not only is the women's lavatory of the garage clean and complete, but it has an ample rest room with a dressing table, reed lounge and chairs for the women.

Each of the two entrance and exit tunnels is finished in white, and the rear of the garage for the storage is white, in contrast to the usual grimy surroundings.

A raised walk runs along the inner wall leading from the office to the women's rest rooms and back into the storage part.

On the wall of each tunnel there is a series of display cases in which are kept a complete stock of Ford parts in neat arrangement; thus the wall is utilized and the goods are placed where they will be seen by customers. Larger parts are kept in the rear where there is more space.

Oil that drips from the pumps inside runs down through a screen to be caught by the tanks. The gasoline tank at the front of the garage and the one inside are connected so that if one goes dry a cock can be opened and the other drawn upon in emergency.



Entrance tunnel of the El Camino garage. The walls are painted white, emphasizing the cleanliness of the whole establishment

Exit tunnel with the display cases for parts on one side

The front of the garage is attractive. Living quarters are provided upstairs for the proprietors and enhance the front

Yes, Railroads Are Recognizing the Truck

PERHAPS You Thought Some of That Talk of What the Truck Might Do in Case of a Strike Was "Bunk." If So, What Do You Think of These Developments?

By William L. Dailey

Washington Representative of MOTOR AGE.

COMPETITION by automobile trucks has forced railroads to lower freight rates in cases where every other argument has failed. A study of the recent decisions of the Interstate Commerce Commission by a representative of MOTOR AGE showed that the cost of hauling by truck has decreased, while the rail carriers are finding it difficult to bring about economies essential to rate reductions.

The fact that several short line railroads have suspended operations owing to truck competition is a disturbing factor in the present agitation for cuts in freight rates.

There has been some talk of regulation of motor trucks by the Federal government, but there are few who anticipate such action. It is believed that federal regulation would find little favor in congress at this time. Some traffic experts insist that laws regulating rail carriers would not be applicable to trucks.

As to the effects of truck competition—the records show that there have been numerous instances where rates on commodities have been reduced on the request of rail carriers. Lincoln Green, vice-president of the Southern Railroad, very frankly admits that competition of trucks forces the lines to reduce their freight rates. He said:

"Our purpose in making these reductions in short-haul rates on cotton was primarily to meet truck and wagon competition not merely within the short radius of the consuming center, but for longer distances to which truck service has been extended, not merely taking cotton away from us at actual railway shipping points, but engaging in the transportation of other commodities in both directions.

RAILROADS ARE RECOGNIZING THE TRUCK; ACTION TAKEN TO CONSERVE REVENUES

"The matter," Green continued, "has been under consideration for more than twelve months, and our action is now taken in the belief that it is in the interest of the conservation of our revenues. Whether the proposed rates will actually enable us to meet the competition and continue to control a share of the traffic is a matter of experiment."

Just how it is possible for trucks to quote lower rates for the transportation of commodities has been illustrated by R. A. Brand, vice-president of the Atlantic Coast Line. He declared that the cost of hauling by truck is naturally on the decrease since wages, gasoline, trucks and parts thereof are declining in price. In discussing conditions in a territory surveyed by the Charleston & Western Carolina Railway of the Southern System, Brand said:

"It fairly may be assumed that the trucks are going to handle a certain amount of cotton in the Carolinas regardless of rail-

road freight rates, just as they are doing as to freight traffic of all kinds, as well as passenger traffic in sections along our lines traversed by improved highways. Trucks make warehouse delivery, which is of value, particularly for small lots of cotton, since drayage is avoided. A reduction in their rates may turn to the railroads some cotton now hauled by trucks, but the revenue derived from this additional cotton will not, as demonstrated by actual tests already made for our line, affect the loss of revenue on cotton to interior mills alone.

"I do not believe that the interests of southern cotton mills," Brand continued, "are adversely affected by the existing adjustment, nor that the producers of cotton will be benefited one iota by the reduction. A reduction in cotton rates will be an incentive to state commissions to bring about reductions in rates on other commodities, and will also be an invitation to shippers of other commodities to press for a general reduction in their rates."

REDUCTION OF SHORT-HAUL AND INCREASE OF LONG-HAUL RATES NOT PERMITTED

The Atlantic Coast Line recently filed a petition pointing out that, owing to competition, reduction in rates on cotton and cotton linters in the Carolina territory will have to be made in Georgia, Florida and Alabama, with the probability of the reductions extended clear into Texas. These statements indicate that the extension of highway systems throughout the south is the one great factor in motor-truck transportation. The railroads, knowing that competition of motor trucks lessened on long hauls, proposed to reduce the short haul and increase the long haul rates, but the South Carolina commission would not permit this action.

It is interesting to note that the railroads, especially the Atlantic Coast Line, believe that the truck competition can only be successfully maintained in cases in which the haul is not more than 50 miles, and then only in territories in which there are good roads.

There are many other commodities affected by motor truck transportation. Refineries have saved large sums by having their products hauled by motor trucks. This fact is made clear by the application of the San Antonio Southern Railroad and the Texas & Pacific Railway asked permission of the Interstate Commerce Commission to reduce their rates. The San Antonio Southern represented to the commission that a refinery at Somerset, Tex., contemplated hauling their gasoline products to San Antonio at an estimated cost of nine-tenths of a cent per gallon. There are many other cases pending before the commission in which the truck is the real rate-making factor.

Defining a Salesman

"A salesman is a man who tells the truth regarding the quality, delivery and price of his goods," is a definition recently offered in a national business meeting.

New Body Offerings in Enclosed Cars

Lincoln Sedan Has Custom-Built Lines

A FOUR-passenger sedan has been added to the regular line of the Lincoln Motor Co., Detroit. It is presented as a body type of particularly high character, such as heretofore has been obtainable only in custom-built automobiles. Originally, this type was sold, on order, as a semi-custom car, but arrangements have been made by which it can now be offered as a regular Lincoln model.

These cars, mounted on a 136-in. chassis, have a smart appearance. Bodies are of hand hammered aluminum panels. The interior upholstery—the kind and color of which is optional—and the body hardware harmonizes with the car's distinctive exterior.

A trunk on the rear is included in standard equipment. The bracket on the rear leather-quarter is ornamental only, as that portion of the top cannot be lowered.

Optionally, this car may be ordered with a third side window, located in the leather-quarter.

Dodge Brothers Sedan and Coupe Improved

THE Dodge Brothers sedan and coupe have been improved with minor refinements. The disk wheels used are done in black enamel with a cream colored stripe. This type of wheel conceals the springs and underparts of the car, giving a cleaner appearance. A heater is used, placed flush with the floor. Handy side pockets, arm rests and windshield cleaner are among the added conveniences.

Wills Sainte Claire Adds Coupe Model

THE latest product of C. H. Wills & Co., Marysville, Mich., is the coupe, one of the features of which is its wide rear seat, affording plenty of space for two passengers.

The coupe is designed for four passengers and is set unusually low, the distance from the top of the roof to the ground being 75 in. The body is of composite construction with aluminum panels. The driving seat has 28½ in. leg room from the front edge of the cushion to the dash. The back seat is set well back from the driver's seat and is 36 in. wide and 20 in. deep. A folding chair tilts under the cowl when not in use and opens into position beside the driver's seat facing forward.

The body is 60 in. long and 49 in. wide inside. The doors have an opening 26½ in. wide. The door windows and rear quarter windows are 22½ wide and the rear window 30 by 14 in., thus providing the maximum of clear vision.

Three body colors are available: Sainte Claire blue, Brewster green and maroon. All inside woodwork is of walnut. Equipment includes windshield sun visor, compartment back of driver's seat, ash tray and match box holder mounted in walnut case, corner reading lights, window shades, door lock and large luggage compartment in the rear deck. All hardware is of special design and of satin finish silver.

Three Business Commandments

ADOPTION of and strict adherence to three business commandments—

"Thou shalt not steal because thou knowest how to get away with it,"

"Thou shalt render to each man his due and shall not lie or cheat him" and

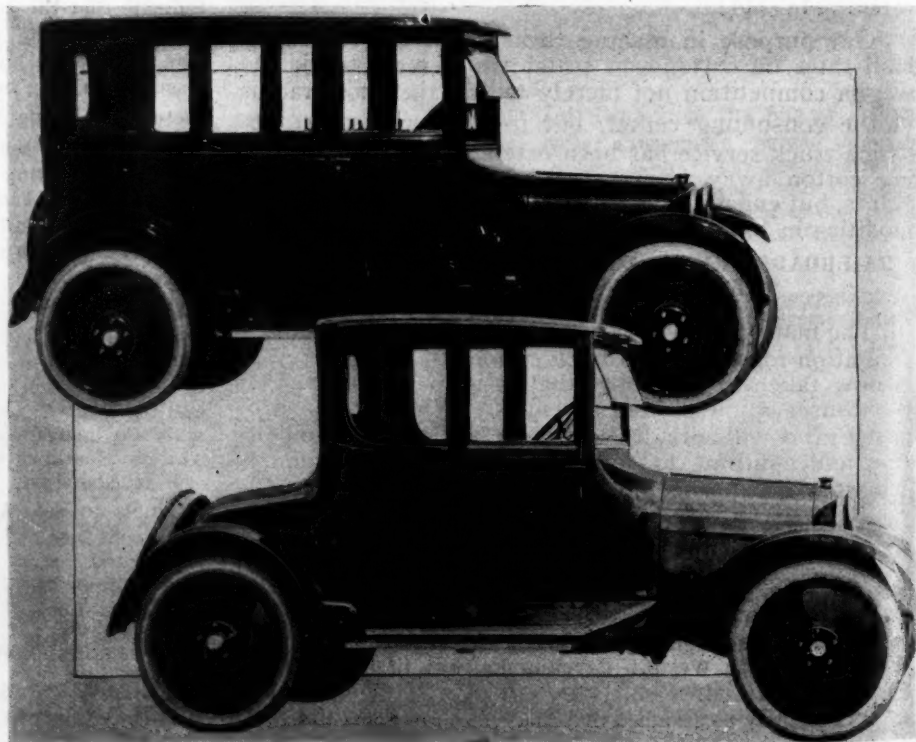
"Thou shalt be honest"

—will assure for the individual automotive dealer or service station proprietor no worry over the winter or off season, provided he can furnish the right kind of goods or service, said Louis M. Pawlett, president of Pawlett & Company, 642 Fairfield avenue, Bridgeport, Conn., distributor of Oakland cars. Whether patronage is to remain steady during the so-called dull months or fall away to a point where expenses top revenue, he points out, rests with the dealer or service man; depends upon whether, during the busy season, he builds up the reputation of a real mer-

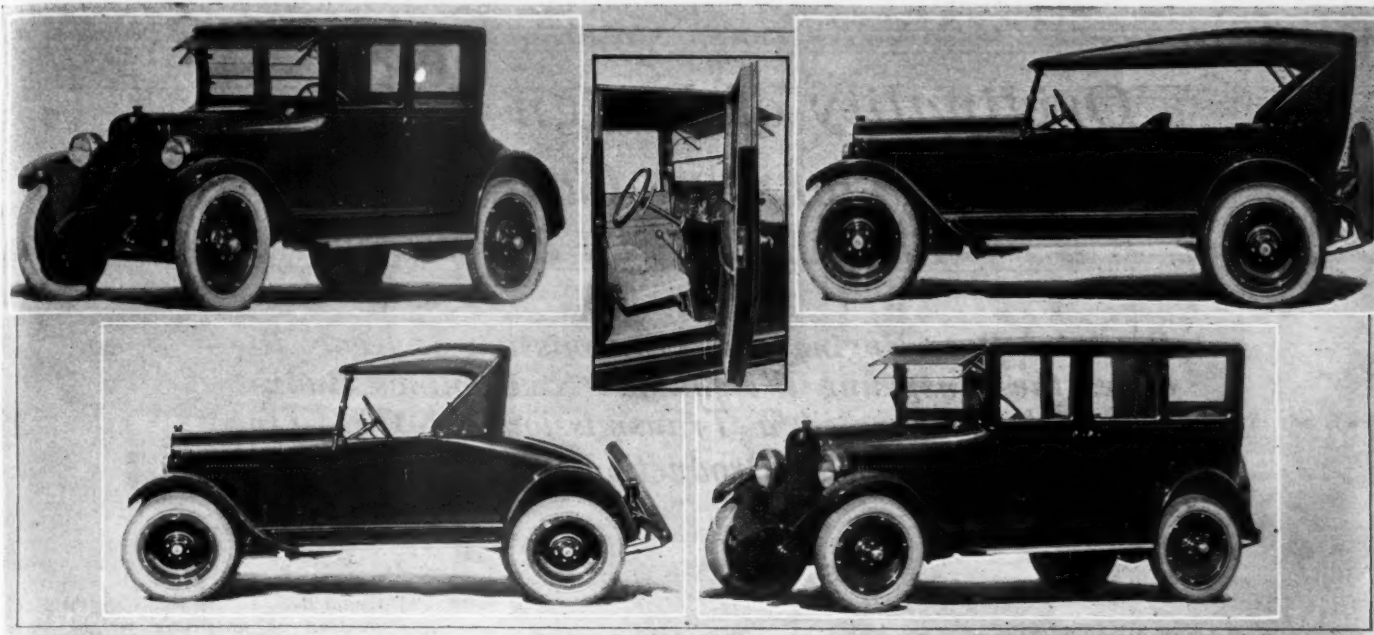
chant, or is known as a "fly-by-night curbstome hold-up man." The reputation must be such that there will be no asking of the question by customers, "Will this firm take care of me if I should get in trouble?"

"The future of America, insofar as motor car sales are concerned," says Pawlett, "hinges on several factors, chief of which is that of convincing the buying public that manufacturers, distributors and retailers are now alive to their individual and collective responsibility to render effective and dependable service after the sale is made and money has changed hands. No man is as much concerned in whether this or that car will bring him back from a trip or not, as in the question, 'Will this firm take care of me if I should get in trouble?'"

"Because burdens of this sort must fall on the ultimate dealer," he continues, "he must be a man of high repute for fair and square dealing. His character must be above reproach. He must know his job from beginning to end. His reputation must be that of a real merchant, not a fly-by-night curbstome hold-up man. And there are still many such in the automobile business. With competition reaching its high point, and quality of product becoming the rule, rather than the exception, the only hope left for the man who is to earn his living selling automotive products reads much like the three business commandments based on honesty."



Minor refinements have been incorporated in the Dodge Brothers sedan and coupe. The disk wheels are done in black with cream colored stripes



The four new body jobs offered by the Maxwell Motor Car Co.

New Maxwell Series Improved in Body Design Frame Redesigned for Greater Strength

THE new series of the Maxwell Motor Car Co., Detroit, is ready to enter production. The frame has been entirely redesigned and bodies are larger and more substantial. The same four-cylinder engine is continued, with only minor refinements. The

new car has been greatly improved in appearance. The radiator is higher and larger. The outstanding feature of the new series is the superior trim and fittings of the bodies. Real leather upholstery is used in the open cars and special broadcloth in the enclosed

models. The seats and back cushions are greatly improved. All doors are provided with pockets and the side curtains open with the doors on solid rods and supports.

There is a plate glass window in the rear curtain of the open cars. The equipment now includes the drum type of headlight, motor driven horn, better set of tools and better body hardware.

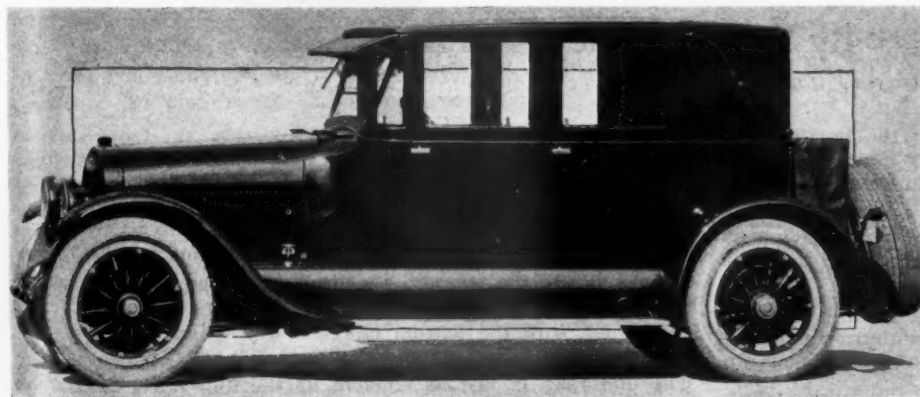
The new 31 by 4 cord tires are used, which help make the car lower. All models are equipped with disk steel wheels, demountable at the rim and at the hub. Wood wheels are optional on the touring and roadster models.

Among the mechanical improvements are the adoption of the Alemite system of chassis lubrication, easier clutch and brake action, longer springs, new mounting of starting motor on the bell housing, new type of tire carrier, and complete equipment of anti-rattle devices throughout the chassis and body.

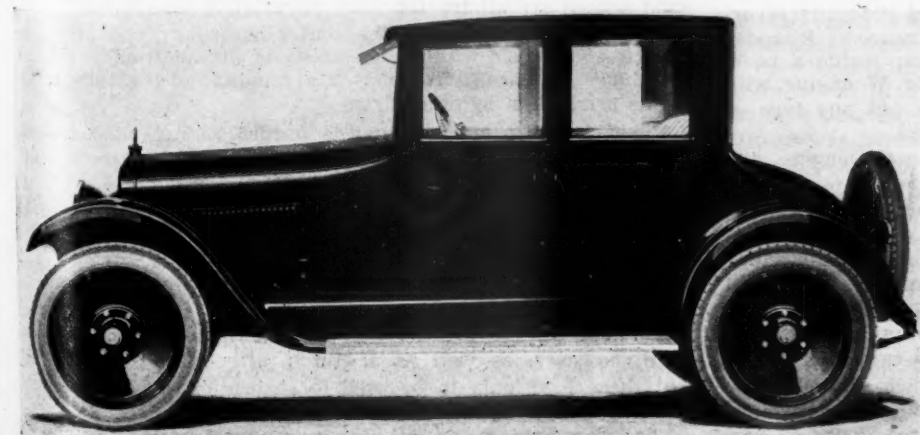
A water-tight leak-proof joint at the bottom of the windshield is obtained by rubber weather stripping which sets against a metal weather strip in the cowl. The cowl lights are miniature duplicates of the drum shaped headlights. They operate from an independent switch for parking. Prices are as follows:

	Old Price	New Price
Roadster	\$845	\$850
Touring car	845	850
Coupe	1445	1385
Sedan	1545	1485

President Wilson states that 24,000 cars, on hand when the reorganization of the company was completed, have been sold, as well as nearly all the 10,000 produced since that time. Former models on hand now average less than one-half car per dealer.



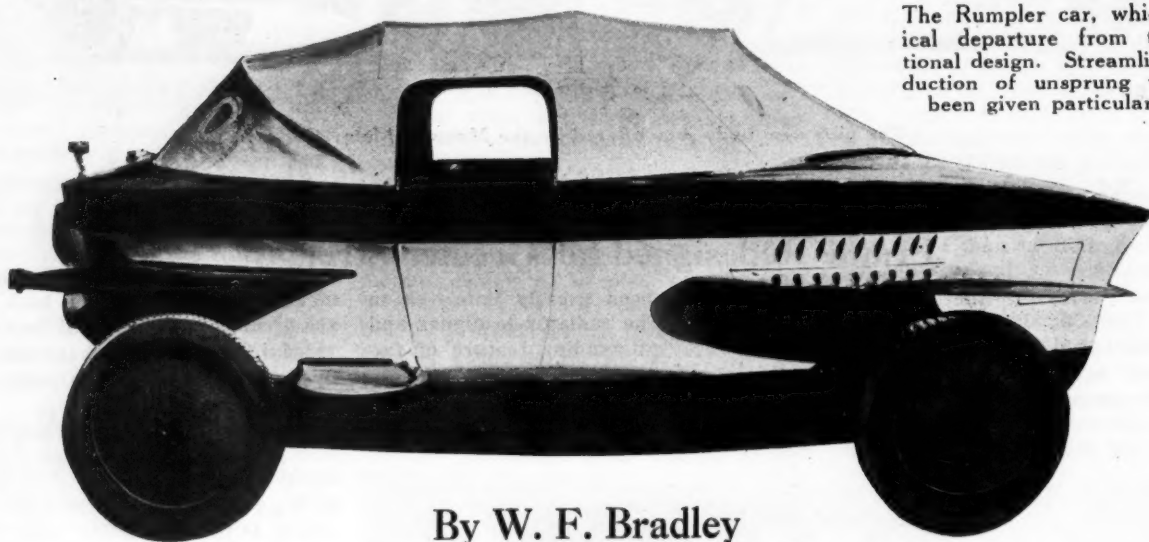
The four-passenger sedan recently added to the Lincoln line has custom-built character



The new Wills Sainte Claire coupe will comfortably accommodate four passengers

Originality of Design in Two German Cars

Rumpler Puts Engine and Transmission at Rear, Reduces the Unsprung Weight and Streamlines Body—Maybach Is Termed a Transmission-less Car—One Cheap Production Job



The Rumpler car, which is a radical departure from the conventional design. Streamlining and reduction of unsprung weight have been given particular attention

By W. F. Bradley

European Correspondent of MOTOR AGE

THERE were two cars on exhibition at the Berlin show that stand out as distinctive, not only among the German cars but among those of all countries. They are the Rumpler and the Maybach.

Before becoming an airplane manufacturer, Rumpler was chief designer in some of the leading German automobile factories, and has tackled the problem of automobile production from the double standpoint of the automobile engineer and the aviation expert. He has sought to minimize unsprung weight, and by the general arrangement of his chassis to obtain the best streamline form.

While other makers have sought to reduce head resistance by modifications of existing types of chassis, Rumpler has laid his whole car out with streamlining in view.

These cars attracted immense attention and generally favorable comment, despite their unusual appearance. Rumpler puts his engine and transmission at the rear inside a boat-type chassis. He has adopted a six-cylinder W engine with all-aluminum cylinders and overhead valves, but any type of four-cylinder engine can be used equally well.

A clutch and a gear box form a unit with the engine, and the final drive is through a common differential to the two road wheels, there being two driving and two driven pinions of different size, but with the same ratios. On the inner end of each of the two axle housings is a bronze semi-circular guide to allow for the rise and fall of the axle as the wheel passes over obstacles on the road.

There is a stay from each extremity of the axle housing to a bronze bushed trunnion bearing on a rear extension of the differential housing. With this design, which Rumpler declares to be fully covered by patents, the only unsprung weight is the wheel, the driveshaft and a portion of the spring.

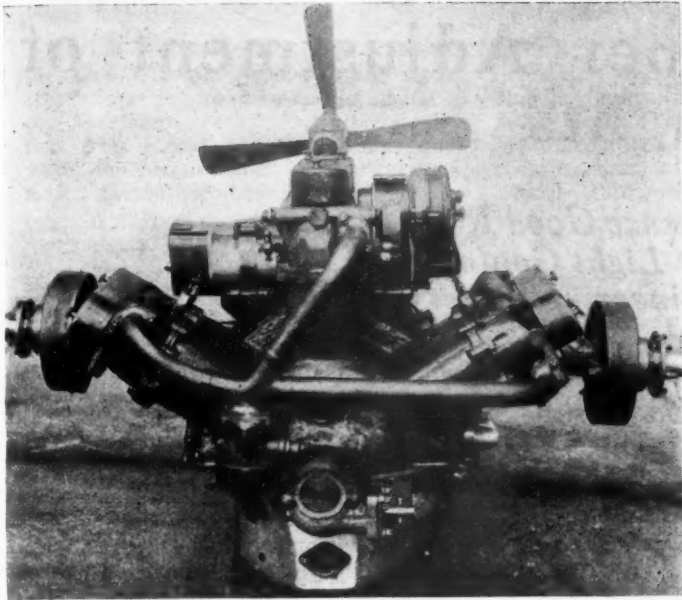
Cantilever springs are used front and rear, the front springs being entirely inside the boat type chassis, and the rear springs having about half their length inside the frame. Steering is at the front, with the axle and steering control lever passing through openings in the frame. This design gives an exceptionally low center of gravity. Even the spare wheels are carried inside the frame. Each one is placed flat on a small bogey, which is pushed through openings in the frame onto rails flush with the bottom flange of the frame members.

A perfectly streamlined body is mounted on this chassis. The underpan is just as efficient as the upper works, and no provision is made for external fittings which would spoil the effect sought. It is impossible to hang a trunk or a bag on the outside of the car. Fenders, doorsteps, headlights and wind screen are all treated from an aviation standpoint. The rear seat is practically on the center of gravity and all passengers are carried within the wheelbase. In addition to building this car himself, Rumpler is arranging to grant licenses for its production by other firms.

Maybach has produced what is termed a transmission-less car. A six-cylinder engine built to the same designs as the Dutch Spyker, having a bore and stroke of 95. by 135 mm., is mounted in the usual type of chassis and drives direct by propeller shaft to a bevel type rear axle.

The starting motor is sufficiently powerful to move the entire car on the level until the engine begins to fire, and this is the usual method of starting away, all the driving being done on the throttle. A planetary emergency gear is fitted, however, as well as a clutch, although it is claimed that these have only to be used for exceptionally steep hills, or when starting on hills.

The rear axle is an all-aluminum construction, and the



The Rumpler engine is carried at the rear in the chassis. It has six cylinders cast in pairs forming a W. All aluminum cylinders are used with overhead valves

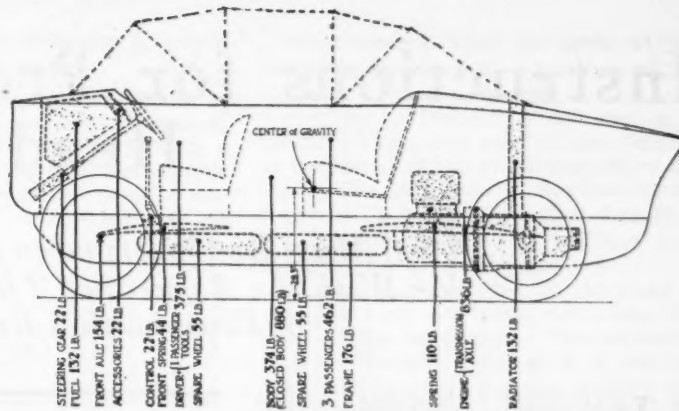
conical housing carrying the driving pinion is also aluminum. Very big diameter brakes are fitted on front and rear wheels, with an adjustment for the application of the rear brakes ahead of those on the front wheels.

Brennabor is the only maker who appears to have laid out his chassis with cheap production in view. The car is a four-passenger with four-cylinder engine of 70 by 102 mm. bore and stroke, cylinders and crankcase in one casting, two bearing crankshaft, overhead valves with push rods, three-speed transmission forming a unit with the engine, a generator-battery type of ignition, center control with left-hand steering, and cantilever suspension.

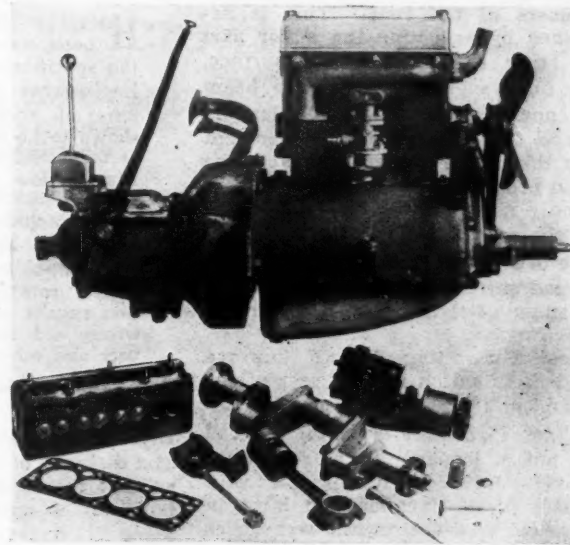
This is the European type four or five-passenger economical light car, which by reason of low exchange, can come into direct competition on all open markets with similar productions of British, French and Italian construction.

Germany's Great 12½-Mile Speedway

THE Berlin speedway was used as an attraction to draw visitors to the automobile show, the first held in Germany since the war. More than a half million of people were visitors at the races, which were run the first two days of the show. This speedway is jointly owned by the German Association of Automobile Manufacturers and the German (formerly the Imperial) Automobile Club. Its construction was begun in 1913, but all work was stopped during the war, and it was only by an effort that the track was finished in



Sketch showing position of the various units in the Rumpler, together with weight distribution



The engine of the Brennabor which was designed with a view to cheap production. It has four cylinders with the cylinder and crankcase in one casting

time for the first races to be held on the day the German automobile show opened.

The main entrance to the track is a few hundred yards from the Kaiserdamm exhibition hall belonging to the German Association of Automobile Manufacturers. By reason of its location it should be easy to make this track a paying proposition.

The speedway consists of two parallel tracks, with a loop at each end, running in a dead straight line through government-owned forest land. The length of the track is 12.4 miles. On the straightaway the average width of the track is 33 ft., this width being increased to 70 ft. on the loops. The space between the two tracks is about 25 ft. Banking on the loops is very slight, and the outer protecting wall is quite insufficient to arrest a car which has got out of control.

On the straightaways there are no safety zones, and the trees which line the track constitute an additional danger in case of a burst tire or breakage of the steering gear. In its present condition, the track is neither safe nor of such a nature that records can be broken on it.

On the first practice day a car went over the top of the banking, and during the first day's racing there were accidents of a minor nature. Material used for the surface is tar macadam. This doubtless will be satisfactory on the straightaway, but it will not stand up on the loops.

This track was laid out at a time when little experience had been had, with the result that gross mistakes were made. Undoubtedly, modifications will have to be made before the Berlin speedway is really satisfactory, but despite this, there is no doubt about the utility of the track to the industry, as a whole, for both racing and demonstrations.



One of the straightaways of Germany's 12½ mile speedway. Its construction is not wholly satisfactory as yet for extreme high speeds. The track is 33 ft. wide in the straightaways

Instructions for Proper Adjustment of Headlights

What Must Be Observed to Insure Good Road Illumination With the Assurance That Light Conforms to Rules of Illumination Engineering Society

HEADLIGHT controlling devices are for the purpose of securing an adequate road illumination without a dangerous glare in the eyes of other users of the road. This is accomplished by deflecting the major part of the beam toward the road surface, leaving the upper portion of the beam of low enough intensity to avoid dangerous glare, while still allowing enough light in this upper region to enable the driver to proceed with safety.

Not only should the light be directed toward the road, but it should be spread sidewise in order that a sufficient portion of the road surface is rendered visible to avoid danger of striking a person or object thereon.

Efficient controlling devices improve the road illumination for the user of the device and at the same time create conditions such that other users of the road are not put in jeopardy by glare. However, such devices require a careful adjustment of the incandescent lamp in the focus of the reflector, and sometimes a downward tilt of the headlamps, in order that the above result may be accomplished. Without careful adjustment in these particulars the use of the pair of controlling devices may result in bad road illumination and excessive glare, their purpose being entirely defeated.

Incandescent Lamps

Incandescent lamps or bulbs at present on the market are of two types: the vacuum or type B lamp and the gas-filled or type C lamp. The filament of the type B lamp is arranged in the form of a small horizontal coil. The filament of the type C lamp is in the form of a "V," which "V" is made up of a minute spiral of wire. On account of the different shapes of the filaments of type B and type C lamps, in many cases a higher candlepower can be used with one type than with another, without exceeding the specified limits of glare. See that the marked candlepower of your lamps is not greater than that allowed with the device you propose using, and that the filaments are well centered in the bulbs.

Adjustment of Tilt

Place the car fully loaded on a level surface, as for instance, the floor of the garage (see accompanying figure). Measure the height of the center of the headlamps from the floor, and cut off two sticks to a length equal to this height. Stand one of the sticks, A, near the front end of the car and the other, B, near the rear. Arrange a board, C, so that it will

To Insure Good Results With Headlights

HEADLIGHT devices, which have been tested and approved under the specifications of the Illuminating Engineering Society for laboratory tests of such devices, are hereby shown to be capable of giving, under certain conditions, the type of road illumination required under the I. E. S. rules. Unless these conditions, which include the rating of the incandescent lamps used, the tilt of headlamps and the focusing, are strictly complied with, the illumination results are liable to be entirely wrong and unsatisfactory both to the user and others on the road.

stand on end, and set this up as a target at a distance of 25 ft. ahead of the lamps, so that the light of one headlamp or of both shines upon it. Remove the front glass from the lamp, or use only the plain glass, and operate the focusing adjustment (see below) so that the light forms a small patch on the target. Sight over the top of the two vertical markers, A and B, on to the target, C, and place a line, H, at the point thus found. This will give the horizontal line. If the height of the center of the beam comes at the same height as this mark, the beam is horizontal. If the device which is to be used is one requiring a tilted beam, put another mark on the target at the requisite distance below the first mark. For instance, if a tilt of 2 ft. in 100 is required, the target being 25 ft. ahead of the lamps, the mark should be placed 6 in. below the horizontal mark. The headlamp is then tilted until the center of the beam comes at this lower mark with the car fully loaded. By shifting the target, the other lamp can be similarly adjusted. The actual tilting of the headlamps is a mechanical adjustment which in some makes of cars is very simple and in others requires some mechanical skill. See that the beams of both lamps point straight ahead. The horizontal distance between the centers of the beams should equal the distance between the centers of the headlamps.

Focus Adjustment

All, or nearly all, headlamps are provided with an arrangement whereby the position of the bulb may be changed with respect to the focus of the parabolic

mirror. This arrangement is sometimes a little difficult to find, but any owner who is in trouble from this cause may well consult a competent garageman. The adjustment of focus, as well as of tilt, can best be accomplished in moderate darkness. It will be found that taking the headlamps without any controlling devices whatever, and throwing the beam from each one separately onto the target, a more or less round spot or patch of light is seen.

By operating the focusing adjustment, the lamp is moved backward or forward with respect to the reflector. The following adjustments are recognized. Some devices require one of these adjustments, others another.

Adjustment No. 1—The center of the lamp filament is at the focus of the reflector. The patch of light made by the beam is then of minimum diameter.

Adjustment No. 2—The lamp is drawn backward from No. 1 adjustment. When this is done, the patch of light becomes larger and finally a black spot appears at its center. When this spot is just on the point of appearing, adjustment No. 2 has been made.

Adjustment No. 3—The lamp position is intermediate between No. 1 and No. 2. The size of the patch of light is intermediate between No. 1 and No. 2.

Adjustment No. 4—The lamp is pushed forward from position No. 1 until a black spot is on the point of forming in the center of the patch of light.

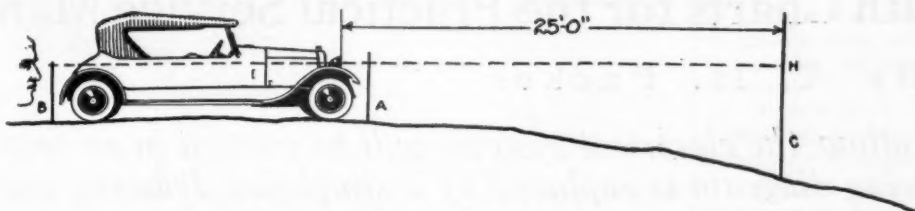
In case the headlamp is so constructed that it is not easy to tell whether one is moving the lamp forward or backward, No. 2 can be distinguished from No. 4 by blowing a cloud of smoke into the beam directly in front of the headlamp. If the rays of light are seen to diverge as they leave the reflector, the adjustment is No. 2; if they converge and cross, it is No. 4.

Be sure that the lamps are positively locked in position after the adjustment has been made. Some types of headlamps are so constructed that the focal adjustment is altered on replacing the front glass. With these headlamps the correctness of the adjustment can be judged by inspecting the patch of light thrown with the device in place. The top of the patch should be cut off more or less horizontally across the top and the major portion of the patch should be below the horizontal line.

From the report of the committee on motor vehicle lighting read at the annual meeting of the Illuminating Engineering Society, Rochester, N. Y., Sept. 26-29, 1921.

Beam Adjustment

Having secured the right tilt and focus adjustment, the controlling device which it is proposed to use is affixed to the headlamps, care being taken to see that it is placed exactly in accordance with the manufacturer's instructions, which should accompany the device. The beam is then once more observed on the



Arrangement for adjusting the tilt of headlights. The car is placed, fully loaded, on a level surface with the measuring devices at the distance shown

target to see whether the upper half of the beam is properly cut off and the light deflected toward the road.

In the case of many devices this cut-off is secured with the bulb at the reflector focus. In the case of some, however, (those which obstruct the light from the upper part of the headlamp) the bulb must be brought back toward the reflector in order to secure this cut-off (adjustment No. 2). With still others (those which obstruct the light from the lower half of the reflector) the bulb must be pushed forward ahead of the focus (adjustment No. 4).

In any case a little experimenting will show what adjustment is necessary in order to secure the sharpest possible cut-off of the upper half of the beam.

Improved Devices

There are several ways in which a substantial compliance with the rules may be insured without purchasing special controlling devices. Among these may be noted the following:

Covering the upper half of the front with a dense diffusing coating or with white paper, and adjusting the bulb back of the focus, as described above, make a fairly good expedient.

Covering the upper half of the bulb with a semi-opaque substance and adjusting the focus as above, accomplishes a similar result. There are other methods which may be employed, but probably none of them will give as good a result as the use of a good commercial device designed for the purpose.

Maintenance of Headlamps

Dust and dirt on front glasses and reflectors cut down the efficiency of headlamps very greatly. Therefore periodic cleaning should be resorted to. Old and blackened lamp bulbs give greatly diminished candlepower and should be renewed. Bad switches and sockets and run-down batteries are frequently causes of a similar result.

Rules for Photometric Inspection of Headlamps on Motor Vehicles and Motorcycles

In order to determine whether the headlighting of a motor vehicle or motorcycle conforms to the requirements

of the law, it may be subjected to photometric inspection as follows:

Without change in any adjustment of the headlamps, the car shall be placed, fully loaded, upon a level surface in a location suitable for making photometric measurements. The engine shall be operated at a speed corresponding to 25 m.p.h. when in high gear.

The horizontal line of the headlamps 100 ft. ahead of the vehicle shall be established by sighting, as described under "Adjustment of Tilt."

The photometric measurements shall be made with a foot-candle meter or an equivalent measuring device.

Measurements shall be made at the following positions at a distance of 100 ft. ahead of the headlamps:

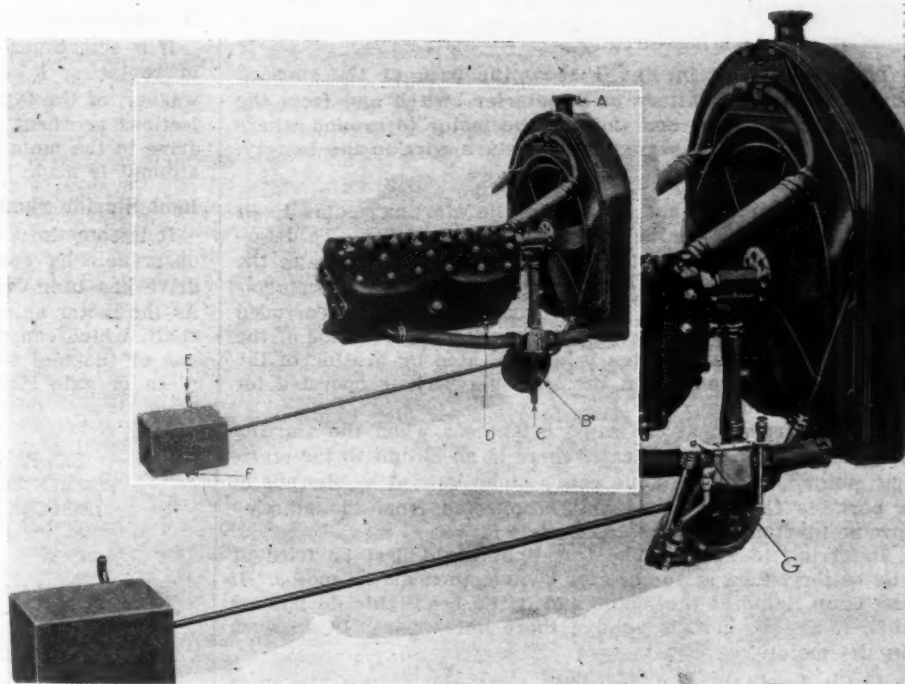
Position 1—Directly ahead and at a height not less than one-half the distance of the center of the headlamps above the road. The indication of the foot-candle meter shall be not less than 0.48 ft.-c. for a motor vehicle and not less than 0.24 ft.-c. for a motorcycle.

Position 2—Seven feet to the right of Position 1 at any point not above the level of the headlamps. The indication of the foot-candle meter shall be not less than 0.12 ft.-c. for a motor vehicle and not less than 0.06 ft.-c. for a motorcycle.

Position 3—Directly in front, 5 ft. above the roadway. The indication of the foot-candle meter shall be not more than 0.24 ft.-c.

Position 4—Five feet above the roadway and 7 ft. to the left of the axis of the vehicle. The indication of the foot-candle meter shall be not more than 0.08 ft.-c.

Note.—In order to allow for any possible inaccuracies of a test of this character, a tolerance of 20 per cent may be allowed on the above values.



Cadillac Makes It Easier to Drain Water Systems

WHILE it is not necessary to drain the water system many times a season, there are times when this must be done and usually it is quite an unpleasant job. It generally means getting under the car with a wrench and removing a pipe plug somewhere in the radiator or pump and then taking a chance of getting the clothes splashed with hot water.

The illustrations herewith show how the Cadillac company has gotten around this matter by a change in the method of draining the water system. Hereafter it was necessary to remove the plug C, which probably was not the easiest thing in the world to reach.

The new Cadillac type 61 has an arrangement whereby the system is drained by merely loosening the slotted screw G with a screwdriver. This means the mechanic can work in a comfortable position and there is no danger of getting the clothes wet while performing the operation.

This is a step in accessibility which ought to pave the way for other equally good features on cars in general, such as better means of draining the crankcase oil. This still is largely a job of removing a plug in the bottom of the crankcase sump, with all the attending inconveniences.

Eliminating the Mystery From the FORD ELECTRICAL SYSTEM

A Practical Study With Charts for the Practical Service Man

By A. H. Packer

In this article, and those to follow, the electrical systems will be viewed in an original manner. The usual wiring diagram is replaced by a simplified drawing and the puzzling kinds are made plain.

Two Kinds of Current Used

ON the Ford car there are two kinds of electrical current used, the direct six-volt current that comes from the battery and operates the starter and lights, and the alternating current of varying voltage that operates the ignition and horn. For the sake of simplicity, two diagrams are used to show all of the car wiring, No. 1, giving the starting and lighting circuits, and No. 2, showing the alternating current circuits.

Starting and Lighting Circuits

The heavy lines in Fig. 1 show the path of the starting current, from the battery to the starter switch and from the switch to the motor, and through the motor to ground where the frame of the car serves as the return wire to the battery.

Starter Trouble

Starter trouble is not always in the starting motor itself but is just as likely to be in the battery or wiring. To determine the exact cause of the failure of a starter to crank the engine, it is well to turn on the lights and operate the starter switch. If the lights go out, it usually indicates a corroded battery terminal or poor ground connection at the frame of the car, the exact location often being indicated by heating of the defective connection, when the starter switch is operated for a moment.

If lights remain at the same brightness when the starting switch is operated, it indicates there is no circuit to the starting motor, and this trouble can best be located by the use of a portable test light (six volt) connected from the starting circuit to ground.

Referring to Fig. 1: The test light could first be tried at the battery, then at the starter switch, then at the motor. If the lamp lights at the motor and if the headlights do not get dim, it shows there is voltage there but apparently an open in the motor.

If the headlights get very dim when the starter switch is operated, the battery may be discharged or a cell shorted or the starter may have a ground in one of the field coils, which would pull a heavy current without producing results. A voltmeter reading on each cell while the starter current is flowing, will check the battery. All cells should show about the same. If one is very low or shows no reading it is shorted. If all are low, an ammeter capable of reading 400 or 500 amp. should be used in the circuit, and if it indicates a low reading, the trouble is in the discharged condition of the battery, while if it shows a reading over 200 or 300 amp. it indicates a short in the starting motor.

Open Circuit in Motor

This may be due to brushes being worn and not making contact with the commutator or may be due to a broken strap, but in either case the cause may be detected by inspection when the motor is disassembled.

Removing Bendix Cover

Before removing starting motor it is necessary to remove the bendix cover under the foot pedals at the left of the trans-

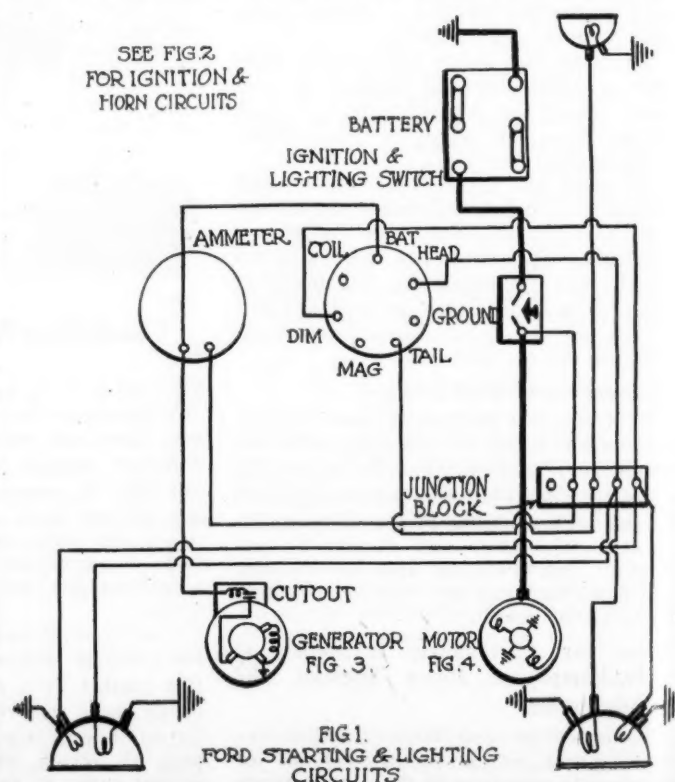
mission, this being held by four screws. When it comes time to replace this cover, a piece of baling wire bent in the form of a hook will be convenient to hold one of the screws, which is somewhat difficult to hold in position. At this point it may be found that the trouble is of a mechanical nature in the bendix drive itself. Mechanical trouble in the bendix will usually have been indicated, however, by a rattling sound when the starter switch is operated.

Mechanical Starter Troubles

It is sometimes found that the bendix spring is broken, and, in replacing it, care should be taken to use a NEW lock washer, of the type with the two projecting ears. These projections are bent up to hold the stud that fastens the bendix drive to the motor shaft, and the ears usually break off if an attempt is made to use them more than once.

Bent Starter Shaft Straightened in Car

It is sometimes found that the shaft is bent, this fact being observable by operating the starting motor after the bendix drive has been removed, while the motor is still on the car. As the motor spins, a piece of chalk can be used to mark the shaft, which can then be straightened right in the car by the use of the tool shown in Fig. 5. This can be made from a piece of axle shaft, and is used as indicated in Fig. 6, the



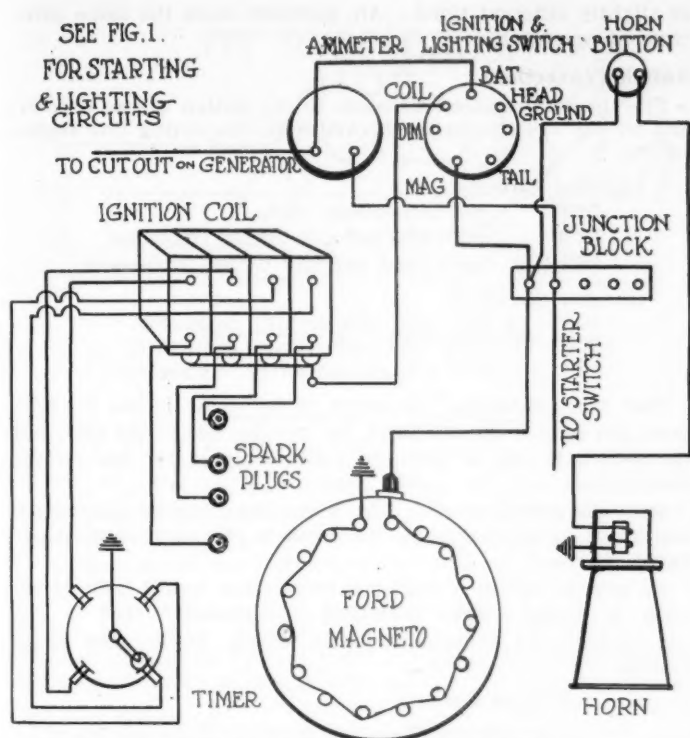


FIG. 2. FORD IGNITION SYSTEM & HORN CIRCUIT

operation of straightening and chalking being repeated until the shaft is perfectly straight.

Removing Starting Motor

To repair electrical trouble in the motor, it must be removed from the car. This requires the removal of the pan on the left side of the engine. The four screws holding the motor to the transmission cover can then be removed and the starter can be lowered from its position. The position of the steering column prevents the removal in any other way while the transmission cover is in place.

Motor Photogram

A photogram of the motor is shown in Fig. 4, the location of terminal, brushes, coils and screws being exactly as if the commutator end bracket were removed but the brushes and holders left in their natural positions. It will be observed that the current from the terminal divides and goes through the two field coils at the left and the two at the right, and unites in a connection at the bottom of the motor. It then divides again, going to the two insulated brushes and through the armature to the two grounded brushes.

Locating Grounds in Field Coils

If the brushes are lifted, and a battery connected to the motor terminal and to ground, a curl of smoke will soon indicate the presence of a grounded field coil. The pole piece should then be removed and the coil insulated with a piece of fish paper or wound with tape, and the pole piece replaced.

Generator Trouble

Locating generator trouble on the car can be simply accomplished by operating the cutout points and observing the ammeter indications. Failure to charge is often due to an open circuit from the ammeter to cutout, and this can be checked by flashing this wire to ground. If it shows no spark, the trouble is in the wiring; but the generator is also likely to need attention if it has run for any length of time while disconnected from the battery, as this burns up either the field coils or armature or both.

If it is ever necessary to run the car when there is no battery in it, a wire should be connected from the generator terminal (not the cutout terminal) to one of the end bracket screws. This will ground the generator and prevent its burning up.

If there is battery current at the generator, the closing of the cutout points will usually pull a heavy current on the

ammeter. If the engine is now started, this discharge current should decrease to zero and become a charge current, but if it fails to do so, there is trouble in the generator.

Open Fields

In the above test, if there is no perceptible change in the discharge current as the engine is operated, the fields are probably open or the third brush does not make contact with the commutator.

Shorted Armature

A shorted armature or grounded armature is usually indicated in this test by the discharge current's increasing up to zero, but failing to increase past that point even at high engine speeds.

Should the generator charge in a satisfactory manner when the cutout points are closed, but fail to cut in by itself, the trouble is either in the cutout or is an oily commutator or poor field connection. A voltmeter can here be used to determine the nature of the trouble, by having it connected to the generator terminal and ground while the engine is turning over slowly.

A reading on the voltmeter, which increases to eight or 10 as the engine speeds up, shows the generator is alright and that the trouble is in the cutout.

Generator Photogram

In Fig. 3 is shown a photogram of the generator as seen from the commutator end, the end bracket being removed, but the brushes and leads being shown in their proper position.

The field current draw on a six-volt battery should be two amperes, and with generator assembled the motoring current should be four or five amperes, the correct rotation being clockwise from the pinion end of the generator. The field leads will be observed to connect with the grounded main brush and the third brush, but these are not always as shown in the photogram, as they are occasionally crossed.

Field Connections

If the generator runs counter, clockwise from the pinion end, it shows that field leads should be reversed. This is sometimes necessary when an armature has been rewound, as it is possible to wind the armatures in two ways which differ but slightly from each other, yet require reverse rotation as generators and produce the reverse rotation as motors. The generator will only generate if run in the same direction that it motors; hence the importance of the motoring test, to see that field leads are properly connected.

Chamfer on Drive End Bracket

To avoid interference in installing the generator on the engine, one corner of the drive end bracket is chamfered or beveled, as shown in the photogram in Fig. 3, and in assem-

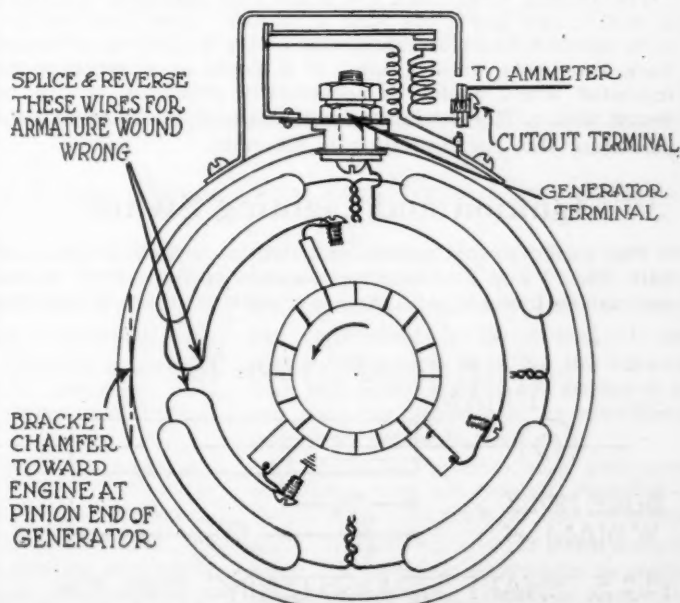


FIG. 3. FORD GENERATOR VIEW FROM COMMUTATOR END.

bling the generator, care should be taken to get the bracket installed with chamfer on the right side.

Grounded Brush Ring

The third brush often becomes grounded, due to the fibre of the brush ring giving way, caused by improper handling.

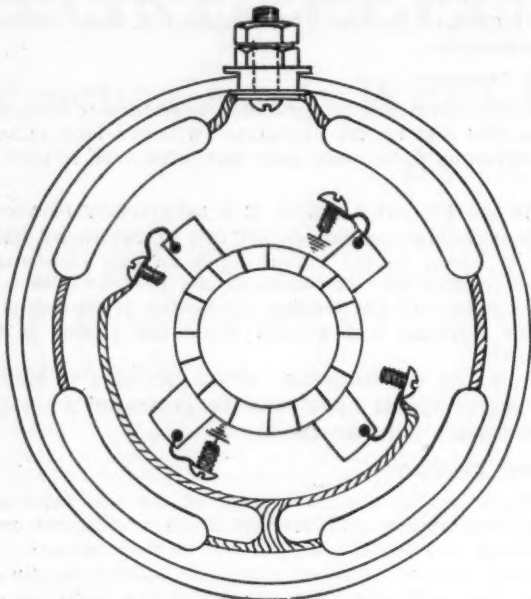


FIG. 4. FORD STARTING MOTOR VIEW FROM COMMUTATOR END

In this case the third brush has probably been shifted without first loosening the locking nut.

These lock nuts are of two types, the larger one being about $\frac{1}{2}$ in. across the flats and being practically inaccessible with any ordinary wrench, which fact accounts for the trouble above mentioned. In Fig. 7, however, is shown an easily made wrench which will reach this nut and prevent injury to the brush ring. On a later construction a smaller nut is used in locking the brush ring, and this can be handled by one of the wrenches commonly found in magneto wrench assortments.

Grounded Terminal Brush

The production of carbon dust, due to the wearing away of the brushes and excessive oiling, commonly produces a conducting paste which grounds the terminal brush. This paste also accumulates between the bars of the commutator, shorting out the armature.

The remedy is to clean the brush ring assembly, replacing it with a new one if the fibre is burned. Also clean out the slots between the commutator bars with a piece of a broken hack saw blade, ground thin. If in doubt as to whether the insulated brush holder is accidentally grounded, it can be tested with a 110-volt lamp line, failure of the lamp to light indicating that the insulation is all right.

Ignition and Lighting Switch

The wiring to the ignition and lighting switch is shown in both Figs. 1 and 2. The exact location of the various terminals varies, however, with the use at different times of switches

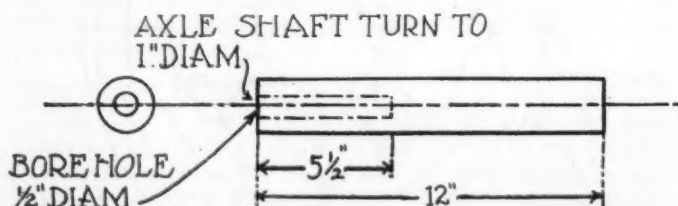


FIG. 5. SHAFT STRAIGHTENING TOOL FOR FORD STARTER SHAFT

of slightly different types. All, however, have the same principle of operation.

Switch Connections

The internal connections made in the switch are as follows, and on any switch can be checked with the testing line shown in Fig. 9.

Lighting Circuits—

OFF	No connections made.
DIM	Bat., dim and tail terms., connected.
BRIGHT	Bat., head and tail terms., connected.

Ignition Circuits—

BAT.	Bat. and coil terms., connected.
MAG.	Mag. and coil terms., connected.
OFF	Coil and ground terms., connected.

This last connection is a sort of joker, as it has no purpose, nor does it do any harm, but occurs, due to the fact that the switch is one of standard make, adapted for use on the Ford car.

With the test circuits of Fig. 9, the lamp should light when connected to the terminals indicated in the various positions shown above.

Failure to obtain a required connection would indicate an open in switch, while obtaining a connection that is not required, would indicate a short which would also cause trouble.

Ignition and Horn Circuits

In Fig. 2 are shown the circuits used in the operation of the ignition and horn, the current used being the alternating current from the magneto, except that in the BAT. position of the ignition switch direct current is used from the battery.

The magneto built into the flywheel supplies the alternating current, which is carried to the terminal of the junction block toward the center of the car. From this terminal a connection goes to the horn button and, when this is operated, the current is carried through the winding of the horn to ground.

Horn Operation

The horn used is suitable for alternating current only, as it has no vibrator, but merely a diaphragm which is attracted by the iron core of the horn and then released as the alternating current passes through its zero value. As the frequency of the current increases with the speed of the car, it

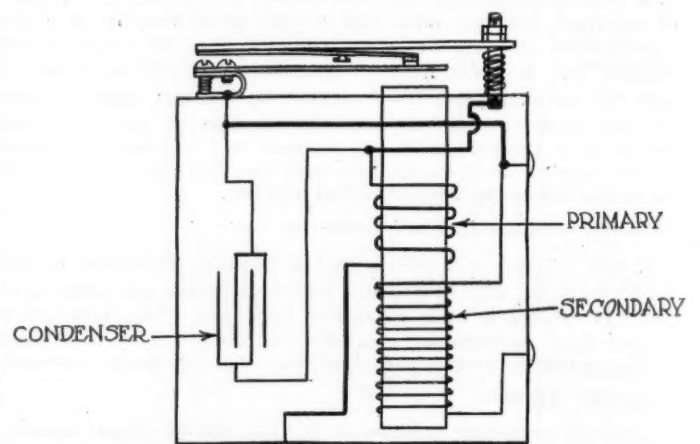


FIG. 10. FORD VIBRATING COIL

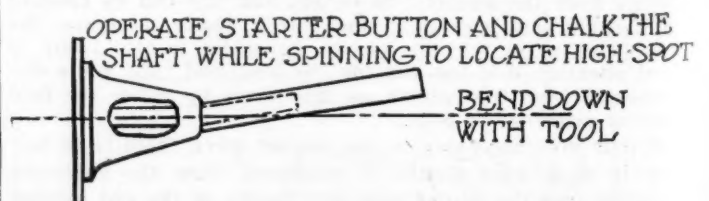


FIG. 6. STRAIGHTENING FORD STARTER SHAFT WITHOUT REMOVING STARTER FROM CAR

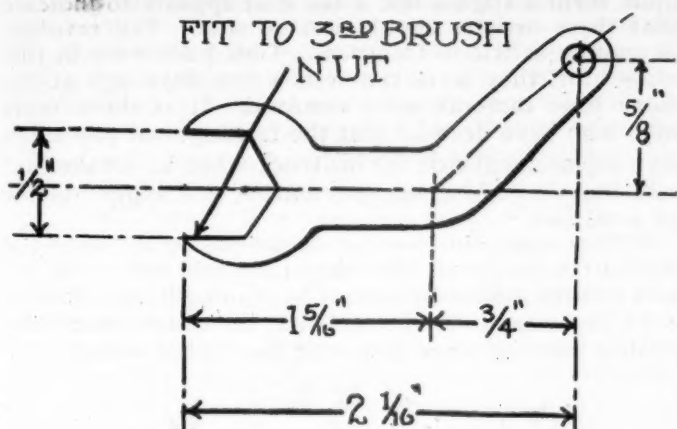


Fig. 7—Wrench for operating lock nut on third brush adjustment on Ford generators. On generators having the small nut, use a magneto wrench. The drawing above is done in actual size and can be used as a pattern for making this tool

causes the horn to vibrate faster at high speed, giving a higher pitched note as the car speeds up.

Ignition Operation

With the switch in the BAT. position, the direct current passes from the coil terminal of the switch to the coil box and to a brass strip at the bottom of the box on which all of the coil units rest, making all of the coils alive. The circuit is completed for but one of the coil units at a time, however, depending on the position of the roller in the timer which completes the circuit to ground. As the coils vibrate in their proper order, the sparks are supplied to the spark plugs.

With the switch in the MAG. position the action is the same except that the alternating current from the magneto is used.

Coil Unit Circuits

The internal connections of the coil unit are shown in Fig. 10, there being four of these in the coil box. As previously mentioned, the current first passes to the lower terminal, and from the diagram it will be seen that the current then passes through the primary winding to the upper vibrat-

ing contact, then across to the lower contact, and on to the upper terminal at the side of the coil. As the vibrator operates and the points open, the condenser connected across the points absorbs the arc and the sudden demagnetizing action produces the high voltage in the secondary winding, which results in the spark at the plug.

Trouble in Coil Unit

Vibrator contacts on which the surface is burnt will give poor ignition, and this condition can be corrected with a thin file which can be run through the contacts. After many miles of operation, however, the layer of tungsten may be entirely worn off from the contacts, so that new ones will be required. This condition is usually indicated by flashing at the contacts and missing of the engine, due to failure of the sparks.

Vibrator adjustment on the different coils should be such that the tune is the same, as variation in pitch denotes variation in the rate of vibration, which affects the time of the spark in the various cylinders and causes uneven running at medium and high speeds.

Variation in the adjustment is affected chiefly by the U shaped support that holds the lower contact spring. The outer screw on this support is a blind screw, under which is another screw that spreads the sides of the U shaped support. Spreading the U shaped piece tilts the lower contact downward, decreasing the spring tension and thus giving a faster period of vibration, but a weaker spark. With the screw turned down slightly, a slight tap on the support will have the opposite result. Turning the nuts which control the position of the upper contact does not have much effect, as the spring tension is increased and the air gap diminished at the same time; these changes have opposite effects and practically offset one another.



FIG. 8. FORD IGNITION AND LIGHTING SWITCH

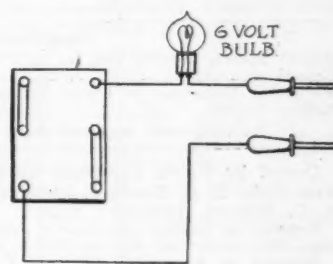


FIG. 9. OUTFIT FOR TESTING LIGHTING SWITCH

THIS article is the result of a practical analysis of the Ford electrical system and a thorough knowledge of presenting it so as to be easily understood and of immediate value in locating trouble. It is suggested that this article be carefully saved for reference in the future. The Dodge Brothers electrical system will be explained in a coming issue of MOTOR AGE.

Intensive Sales Methods Behind Used Cars Pave Way for New Car Sales

W. M. COVEY, of Portland, Ore., is going ahead on the lines that already have brought him success, and he said:—"Through all this talk about business depression we have consistently maintained an optimistic attitude and kept right on trying to improve our service further, and to increase car sales by the most intensive methods. The rapid growth of our business is the result of a number of important factors.

Our records of sales prove that people have not stopped buying motor cars. They are simply buying with greater care—buying from dealers who have demonstrated their willingness and

ability to stand behind the manufacturer's guarantee, and to provide adequate parts and mechanical service.

People have learned to appreciate the wisdom of buying nationally popular cars—cars made in quantity from makers financially strong and permanently established.

"Another and perhaps the most important factor involved in our business is our success selling used cars. Trading-in, rebuilding, refinishing and selling the used car presents the greatest problem in the motor car business.

"Many years ago we recognized that

the dealer who was to lead in new car sales must first lead in used car sales; consequently, we are developing our used car department to the utmost of our ability. More than 20 of the 104 workers with this establishment are employed in our used car department as rebuilders, refinishers and salesmen.

"We rebuild, refinish and guarantee used cars with no thought of profit—USED CAR VOLUME is our objective point. We look to new car sales for our profit. A used car salesroom is maintained at our plant, which is some distance from our new car salesroom."

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Are We Ignorant?

IT WOULD appear that some of the excuses made by the senators in explaining their votes against the Smoot sales tax bill are just a bit arrogant. One senator said that he had received many telegrams and letters urging him to vote for this bill, but that these people were mistaken; that they did not want this sort of a tax.

This assumption on the part of representatives of the people might easily be construed as a danger point in our government. If this is to be "a government of the people, for the people, by the people," it will make mistakes, but the blame for these mistakes will be "on the people." If our representatives assume that this is to be a government "by senators," then the mistake must be on the senators.

Of course, our representatives, in enacting measures for the government of the people, are supposed to resist mob spirit and not to do things on the impulse. But this sales tax has been up for a considerable time; some of the best minds in the business world have debated this in their public forums and such institutions as the Chamber of Commerce of the United States have taken a definite position. This debate and its conclusions are set at naught by a few men who decree that all but them are mistaken.

It was these same men who designated the automobile and its kindred vehicles as "luxuries" and placed

upon them a stigma tax, a tax that appears to indicate that these articles should not be sold. The revolver is another article in this class. Golf balls were in this class until they were removed a few days ago at the same time cameras were removed. It is these same men who have decreed that the farmer must pay a tax on a replacement axle for his truck when he breaks that axle hurrying his wheat to a market that sagged below \$1 a bushel.

If this senator insists that the people do not want the Smoot tax law, even after they have told him so in letters and telegrams, he cannot be blamed if one of these days he awakens to the fact that his constituents also made a mistake when they sent him to the senate.



Helping the Service Man

FREQUENTLY a car owner, in paying for a repair operation on his car, complains of what to him seems an excessively heavy bill. The car owner probably is justified in his complaint; likewise the service station is justified in rendering the bill. But somewhere something is wrong.

That something usually can be traced to the design and construction of the car in question. The old story of not being able to get at a part readily—inaccessibility.

A man may want a new starting motor gear put on the flywheel of his car. The actual job of putting the ring gear on the flywheel is simple, usually consisting of shrinking it on, but what about getting the flywheel out?

Why is it that on some engines a mechanic, to pull the flywheel, has to remove all the connecting rod and main bearings, so that the whole shaft and flywheel can be dropped, just because there is a flange on the flywheel housing that will not let the wheel be slid out horizontally? It means not only removing all this mechanism, but means that the bearings will have to be adjusted again when reassembling.

And again, why cannot cap screws or studs be placed far enough away from surfaces so that a mechanic can slip a socket wrench over them, instead of having to worry them out with a double end wrench? Certainly the little extra material which might be required would be more than offset by the rapidity with which service operations could be performed. Many a service manager scratches his head trying to find some good excuse to hand to the customer in accounting for the length of time it took to make a repair. He dare not say "the car is inaccessible." Still the shop must be paid for the time put in.

It is to be hoped that the new models to be seen at the coming shows will reveal more attention given towards making the service man's job easier.



Watch Your Mailing Lists

THE new postmaster of Chicago is a business man, and when he took over his new duties he was amazed to learn that more than 300 of the best men on his staff are engaged in correcting mistakes made by persons who address mail. Also he was amazed to learn that one out of each 149 letters reaching the Chicago postoffice go to this "hospital." The postmaster needs these 300 men for other work, especially that of quickly delivering mail. So he has designated certain of his men to go before business men and ask that they take steps to correct the addresses of their mail.

One great source of misaddressed mail is faulty and aged mailing lists. There comes to MOTOR AGE each

day mail addressed to persons who have not been connected with this publication for long periods. Some of them have been gone for years. Much of this mail is from great manufacturing concerns. It appears that a business man will spend much money to get a mailing list and then regard it as correct for all time to come.

Then, too, there is a tendency to buy a mailing list without inquiry as to the character of the person selling it. Frequently lists years old are hawked about in this way. Much money will be spent to prepare letters or other advertising material and it will be sent to a perfectly worthless list and, as a result, the mail service spends much time over these letters and then returns them to the writer. And in one case we know of, the office boy threw away all of these returned letters without correcting the list. If any business man will only look over the addresses of the mail that reaches his establishment, he will get a fair idea of how badly he is doing the same thing, unless he is the exception who knows the source of his mailing lists and then undertakes to keep them up to date.



Advertising "Endurance"

THE advertising of motor cars in mediums for the general public has often been severely criticized as being too superficial and savoring too much of the luxury idea. Several months ago the National Automobile Chamber of Commerce made an inquiry among several thousand car owners as to what feature of their car interested them the most and what fact they would like best to know about the next car they bought.

The replies left no doubt as to the attitude of the public. Endurance was first. Of course, endurance is a difficult thing to talk about but some recent publicity on behalf of the Studebaker cars has been driving this point home. These advertisements are based entirely on sales figures and they show that, while the number of sales of cars is steadily growing, and the number of cars in use is growing by rather startling percentages, the sales of replacement parts are steadily decreasing. There is, of course, but one explanation of these figures: it is that the cars are standing up better than ever before.

In explaining the quality of these advertisements, the Studebaker folks say they were written by President Erskine of the company. Evidently the ad writers have gained an important recruit.



Why Be the Goat?

THE apartment house superintendent had summoned the plumber early in the morning to repair some damage to the hot water pipes, and as the hours passed the housewives who were waiting for hot water with which to proceed with the family washing grew impatient. Finally the plumber arrived, and he took more of the women's valuable time to explain, "If that ——— garageman had fixed my car right, I would have been here hours ago."

The plumber continued to talk in this strain for some little time until one of the women, whose living comes from the automotive industry, became tired. She decided that it was her turn. So she talked to the plumber in this strain:

"I don't know just what the mechanic did to your truck, but I am willing to wager that if he had reversed the hot and cold water pipes that your engine would not run at all. Yet that is what the plumber did to the pipes in my bathroom, in this house, the last time he was here."

"It is entirely possible that the mechanic used some defective material in repairing your car, but I am willing to wager that when you told him about it he did not refuse to change it. Two weeks ago there was a plumber down here and I pointed out to him that the joint he had been working on was leaking, and he said, 'It'll be all right in a day or two.' That day or two has passed and you are here talking instead of fixing that very joint. While you are talking about something that you know nothing about, we women are waiting."

"There are three faucets in my apartment that supply only about half as much water as they should. The plumber who was here two weeks ago said he had fixed two of them, but he had not. The volume of water was greater until he had started for the shop. Then the faucets had a relapse. He said he would be back the next day to replace the third faucet. He has not yet returned."

"You talk about the noise in your car that the garagemen cannot take out. What is a little noise on the street, compared to the pounding in this house every time the people in the apartment above ours turn on the hot water to their bathtub?"

"I, too, have been disappointed sometimes by some of the work turned out by automobile mechanics; but, to the best of my belief, the plumbers will have to hustle if they catch up with the automobile mechanics."



Find This Man

THE types of men produced by the automotive industry are as many and varied as the line of a well-known preserving company. There are mechanics and mechanics—mechanics from the old steam engine school, mechanics who were once practicing blacksmiths, and, last but not least, we have mechanics who have forsaken the machine shop for the interesting and nerve-racking life of the automobile repairman. This is not all. There has been a migration to these ranks from the farm via the automobile school and the army trade schools.

A diversity of mental traits is required for success in this business. Some of these men have developed into production type mechanics, others have studied and observed and have achieved that station where they can be pointed to with pride as being diagnosticians or trouble-shooters. This type is invaluable when properly teamed. But in the service stations throughout the land there is a crying need for another style of mechanic. The man we have in mind is indispensable in any reputable institution, teamed with the diagnostician. He is needed badly these days, because of the trend towards high speed and delicately fitted and balanced engines. Labor-saving machinery has not entirely eliminated the demand for manual skill, and we want a man to fit and scrape bearings for our full pressure oiling systems, to fit piston rings carefully and to execute the many painstaking operations incident to the thorough overhaul of the high efficiency engine.

This man is the skilled workman—he of the dexterous hand and accurate eye. These men are found now in scattered places—in aviation, in the experimental room, in the racing branch, and tucked away in the cities and towns in some unknown shop.

If we are to eliminate many of the complaints from owners regarding service stations; if we are to live down the present prejudice concerning the efficiency of repairshops, we will be making one advance by bringing this man out from the nooks and crannies and putting him where he will do himself and the industry the most good.

November to Hold October Levels

New Models and New Prices Stimulate Car Production

Anticipating Continued Brisk Fall Business Detroit Factories Will Not Cut Schedules

DETROIT, Nov. 7—Production in the Detroit district in November will continue along the steady levels maintained in October, with slight falling-off looked for in some factories and in others gains due to decreased prices, new models and intensive selling efforts.

Ford Motor Co., with a production which will total approximately 85,000 in October, will manufacture about the same number in November, sales being reported as steady in all parts of the country and every indication that they will continue so. Revival in export business is having an important part in maintaining high Ford production marks.

In the opposite price extreme, Packard has come through with a strong October business and looks to improve on this in November, owing to lower prices on the single-six line. A production of 10,000 of this model was to have been reached by December of this year. With a month to go, this total is assured and will be exceeded.

Enclosed models in the twin-six line are reported sold six weeks in advance.

(Continued on page 32)

SEEK LOAD LAW REPEAL

Bridgeport, Conn., Nov. 5—At a meeting of the Auto Truck Owners' Assn. of Connecticut at Norwalk last week, former Attorney General John H. Light of that city was named counsel for the organization in seeking the aid of Governor Everett J. Lake to call a special session of the legislature for repeal of the carrying capacity law. Truck owners from 50 cities and towns were present.

CHARLES E. MILLER TO RETIRE

New York, Nov. 5—Charles E. Miller, who has for years conducted one of the largest automobile supply houses in the United States, has decided to retire from the general automobile jobbing business. He will establish himself as a manufacturers' agent after selling his present business as a going concern. Miller has been widely known as a manufacturer, jobber, exporter and importer.

DuPont Makes Statement Stilling Oldsmobile Rumor

New York, Nov. 7—The following statement in reference to rumors regarding the policies of the General Motors Corp. has been issued by President DuPont:

"It is but natural that there should have been constant gossip during the

past few weeks while automobile price revisions were under way. The policies of General Motors with respect to certain of its manufacturing divisions were not immune, the future of Oldsmobile being the subject of persistent rumor.

"This division is in a healthy condition with its business stabilized and sales increasing in the face of the coming winter. The present line of passenger and commercial cars, with gradual improvements, will be continued for 1922 and 1923 selling seasons. Thereafter new models, as may be required by the trade, may be introduced."

Willett Heads Durant Motor Car Co. of Indiana at Muncie

New York, Nov. 7—W. R. Willett, veteran of the automotive industry, has been elected president and general manager of the Durant Motor Car Co. of Indiana, which will manufacture the six-cylinder Durant car in the former Sheridan factory at Muncie. A good share of Willett's business career has been spent with the General Motors Corp. His latest work with that company was the organization of the Saginaw Products Co. division. His apprenticeship in the industry was served in the Buick plant from 1904 to 1909. From 1909 to 1910 he was acting manager of the Ranier plant, and later manager of the Welch Motor Car Co. at Pontiac for General Motors. He was works manager for the Gemmer Mfg. Co. of Detroit from 1913 to 1916, and later was general manager of the Chevrolet plant at Bay City, Mich. His first task will be to equip the Sheridan plant for the manufacture of the Durant six.

DURANT CHICAGO DISTRIBUTOR

Chicago, Nov. 5—W. C. Auble, under the firm name of W. C. Auble Motor Co., has been awarded the Durant franchise for the distribution of the new Durant cars in the Chicago territory. The new distributor will be located in the heart of Chicago's motor row and until spring will share quarters with the present occupant of the building. Territory included in the Auble contract consists of Illinois from Springfield north, northwest corner of Indiana, river counties in Iowa to and including Dubuque, four counties in Missouri and the southwest corner of Wisconsin. It is said that cars will be placed on sale here within a month.

NO CHANGE IN DODGE BROTHERS

Detroit, Nov. 5—Seeming to set at rest the question of change in ownership or management of Dodge Brothers, is the announcement that Fred J. Haynes will continue for a number of years as president and John Ballantyne as treasurer. These two men have been in charge of the company since the death of its founders, John and Horace Dodge.

Dealer Contracts, Used Car Problem to Occupy N. A. C. C.

Over-Production and Loose Business Methods Recognized as Causes for Cure

NEW YORK, Nov. 7—Recommendations for contract modifications which have been approved by a special committee of the National Automobile Chamber of Commerce after a series of conferences with representatives of the National Automobile Dealers' Assn., were submitted to directors of the N. A. C. C. at their monthly meeting here Nov. 2. If the suggestions are approved by the directors, they will be submitted to the individual manufacturers for such action as they see fit to take.

The conferences between the special committees representing the two organizations have been marked by a spirit of cordiality and an honest desire to cooperate in solving problems which affect both branches of the industry. The proposed contract changes are in no sense radical, but they are designed to remove some of the causes of the friction which has arisen in the past.

After the directors have taken action on the contract changes, they will spend the major portion of their time wrestling with the used car problem. The N. A. C. C. has undertaken a survey of the entire situation with the idea of improving conditions, which have become serious not only for dealers, but for manufac-

(Continued on page 32)

ACOSTA BREAKS ALL RECORDS

Omaha, Neb., Nov. 5—Flying at the rate of 176 m.p.m. in a Curtiss navy racer, Albert Acosta broke the record for 150 miles over a closed course here at the Pulitzer trophy meet Nov. 2. Acosta made the five circuits of the course in 52 min. and 9.2 sec.

Constitutionality of Gas Tax To Be Tested in Suit

Harrisburg, Nov. 7—The constitutionality of the new state gasoline tax of one cent a gallon will be put to the test, according to state officials, as a result of the refusal of the Atlantic Refining Co. to pay the tax on gasoline sold for export, inter-state commerce or manufacturing.

The company sent to Auditor General Lewis a check for \$39,426, representing the tax on gasoline sold for internal combustion or motor vehicle, gas engine and similar purposes, but informed him it did so under protest, having been advised by counsel that the act was unconstitutional.

The return, it was stated, did not include the tax on gasoline sold for export or interstate shipment.

Optimism Prevails at the London Show

Manufacturers Find Dealers Ready to Talk Contracts

Demand Especially Good for the Smaller Cars—18 American Firms Have Displays.

BY M. W. BOURDON

Staff representative of Class Journal Co. in United Kingdom

LONDON, Nov. 6—The fifteenth annual London show opened yesterday at Olympia and White City. The exhibits were in place Thursday morning, affording a private view for the dealers and press. It is as yet too soon to make predictions for 1922, but hopefulness almost to the point of optimism prevails at most of these stands. Despite no appreciable recovery in other industries, the majority of exhibitors at Olympia and White City are cheered by the dealers' reports and greater readiness to discuss contracts than was manifested at the show last year. This is especially true concerning cars under 150 cu. in. piston displacement.

There was a good attendance for the first few days, but the crowd does not approach that of 1920 in size. This is partly due to the divisions between Olympia and White City. Show visitors neglect the latter section and thus place the exhibitors there at a great disadvantage. At White City there are also shown several makes of marine engines and motor boats. There are 145 different makes of cars exhibited, together with 50 makes of bodies. Seventy-eight exhibits are British, 34 French, 18 American, 9 Italian, 3 Belgium, 2 Swiss, 1 Dutch.

The American cars at White City include Essex, Moon, Dixie, Hudson, Stanley, Paige, Dodge, Alsace, King and Packard. The cars of American origin at Olympia include Dort, Buick, Chevrolet, Oakland, Nash, Overland and Cadillac. The regulations prohibit exhibits by concerns in financial difficulties, consequently the British Angus-Sanderson, Austin, Bead and Sizaire-Berwick are not represented. The prices on most of the British cars have been considerably reduced and several announcements to this effect were made just before the show opened. Because the new rule prohibited variations in prices during the show, the new Rolls-Royce four did not make its appearance at the show, nor will officials make a definite statement concerning it.

The outstanding feature of the show is the number of new small cars. Twenty makers, eleven French and nine British, are showing water-cooled four-cylinder cars with a piston displacement under 70 cu. in. Many of these small cars can be had in either two or four-passenger bodies. Seventeen British and one French make of these cars have two-

cylinder models of the same engine capacity and most of these are aircooled. The delay was due to trade conditions chiefly. The new design Straker-Squire reintroduces in a modified form the pre-war 15-horsepower car, supplementing the post-war car with the overhead camshaft. This company is ignoring the two-cylinder cars.

The following percentages apply to the individual models of all nationalities: four-cylinder cars, 76 per cent; six-cylinder, 17 per cent; eight-cylinder, 5 per cent; twelve-cylinder, 2 per cent.

Detachable heads, 58 per cent; valves in the side, 64 per cent; valves in head 17 per cent.

Overhead camshafts, 12 per cent.

Sleeve valve engines, 7 per cent.

Pressure lubrication, 61 per cent.

Magneto ignition, 77 per cent.

Vacuum feed, 58 per cent.

Unit power plant, 43 per cent.

Cone clutches, 46 per cent.

(Continued on page 30)

Blue Book and Motor Life Are Bought by J. J. White

New York, Nov. 7—The property of the Automobile Blue Book Publishing Co., which includes "Motor Life" and the "Blue Book," have been sold to Joseph J. White of the Hill Binding Co., of Chicago. The sale was made for cash by the credit stockholders who have been operating the property for the past few months, in accordance with a resolution adopted by the stockholders, directing that the sale be made on Nov. 1. There will be an immediate distribution of the assets among the credit stockholders.

The property probably will be operated as heretofore both from New York and Chicago. It is likely the printing, mechanical work and distribution will be handled in Chicago. The business is in good hands, and under the new ownership the Blue Book is expected to go forward to new records of usefulness.

Trucks Carry New England Freight to New York Doors

Boston, Nov. 5—The Oceanic Ferries Co. has been established in Boston with Fred H. Adams, for years a motor truck salesman in this territory, as the founder. It has been under consideration for more than a year, and offices have been opened now at 45 Milk street. The company proposes to run a fleet of 180 trucks between big industrial centers in New England. At Providence there they will be loaded on one of the three twin screw steel steamers for New York, arriving at the latter place before 9 a. m. Reaching New York, the vehicles will drive off and deliver their loads and pick up other loads for New England. The company promises a delivery from door to door guaranteed in from 16 to 20 hours.

Cheer Fills Outlook for Industry Throughout Winter

Seasonal Decrease in Sales Expected for Next Three Months—Makers' Schedules High

NEW YORK, Nov. 8—Conservative estimates of motor vehicle production in the United States for 1921 forecasts a total of 1,700,000 passenger cars and trucks. This compares with 1,928,000 passenger cars and 348,000 trucks in 1920. Inasmuch as it was predicted that 1921 would be a "million car year," this output should be highly gratifying to the industry, for it should demonstrate conclusively that the sale of motor vehicles is established on a solid foundation, regardless of general industrial conditions.

Shipments of motor vehicles for October were only 11 per cent less than for September and they were 96 per cent of shipments in October last year, which showed a 26 per cent decline from September.

An even more striking illustration of the fact that there has been little deviation in production from month to month is found in a report of the business done by members of the Motor and Assessor's Manufacturers' Assn. for September, which showed an aggregate gain of 1.9 per cent.

Reports from Detroit are to the effect that manufacturers there do not expect a material reduction in output for November. Some of the companies making the higher priced cars believe it will be necessary for them to increase their output.

Notwithstanding this optimistic outlook, however, it is probable there will be a seasonal falling-off in the number of sales for the next two or three months. Heavy demand for enclosed cars will tend to hold up the volume of business as measured in dollars.

Attention of manufacturers has been centered of late on the used car problem and a careful survey of the field is being made in an attempt to find a solution. After the investigation has been completed it is proposed to make recommendations to manufacturers which will be designed to minimize the evil, although it is not expected it can be eradicated. Overproduction has been one of the causes of trouble in the past, and car makers will hold their future output more closely to an order basis than they have done in the past.

Renewal of demand in the truck field is evidenced by the large number of price reductions on commercial vehicles which have been made in the past few weeks. Truck makers are now entering a period of competition as keen as that which has prevailed for several months in the passenger car field.

Dealers Report Monthly Under New Missouri Law

Garage Owners Must Keep Record of Storage and Identification and Report to Police

ST. LOUIS, Nov. 5—Motor vehicles are placed on much the same basis as real estate, and theft of them is made hazardous by the Bestor motor vehicle law, which went into effect in Missouri, Nov. 2. The law revises all state statutes on motor vehicles and makes laws apply about the same in country as in city.

One of the provisions intended to stop automobile thefts is the requirement that each owner of a car obtain from the commissioner of motor vehicles a certificate of ownership, which must be passed with each sale of a car just as a deed passes with a sale of real estate.

No license plates may be issued until such a certificate has been obtained, \$1 paid and all data by which the individual car may be identified has been furnished. Every owner of a motor car in the state must obtain a certificate within four months after the law goes into effect.

The certificate is good until the car is sold, when it must be indorsed with a warranty of title and transferred as a deed. The new owner must present the assigned certificate when he gets his license plates. In case the car is sold out of the state or dismantled, the certificate must be returned to the commissioner of motor vehicles. Sale of a car without transfer of the certificate is declared unlawful, fraudulent and void.

The police may require drivers of cars to establish ownership by production of the requisite certificate, and the commissioner of motor vehicles is required to help trace stolen cars taken into other states.

Dealers must make monthly reports to the commissioner of all cars sold; garage proprietors must keep record of car owners and identification marks on all cars they store; obliterating or altering a motor number is declared prima facie evidence of larceny. Garage owners are required to notify police of such cases and to hold cars 48 hours for investigation.

Registration fees, after Jan. 21, 1922, increase \$1 for passenger cars and about 25 per cent for commercial vehicles, the fees on the latter being based on tonnage. A new state official, the Commissioner of Motor Vehicles, is intrusted with enforcement of the law.

Chauffeurs must be licensed after filing of name, data concerning himself, and endorsement of two motor car owners as to good character, and filing of two photographs. The chauffeur's license will cost \$3, and each chauffeur will be issued a metal badge with his number, which must be worn on his clothing.

"Registered operators" of motor cars will be licensed in a manner similar to chauffeurs.

Commercial cars shall display plates giving weight and capacity.

Speed limit shall vary from 6 to 25 m.p.h., depending on local traffic, and the tonnage and type of tires.

Gross weight of motor vehicles on public highways are limited to 28,000 lbs.

Tractors with cleats shall not be operated over roads of a higher type than gravel, unless suitable protection is provided to prevent damage to the road surface; also tractors weighing more than four tons shall not pass over paved roads unless protection to road is provided; and in case roads are damaged, the vehicle causing it shall be subject to a lien to pay the cost of repair.

A complete set of rules of the road, including hand signals for turns, requires white headlights and red tail lights of uniform kind on all motor cars. The lenses must be approved by the state. Spotlights are prohibited in towns.

Cadillac Plans Dealer Aid in Disposing of Used Cars

Detroit, Nov. 5—Cadillac Motor Co. is undertaking to assist dealers in handling used car sales through the establishment of a used car exchange of ideas, which will be handled through the advertising department.

Cadillac dealers who are meeting the used car problem successfully will be asked to submit their ideas and plans for the use of other members of the Cadillac sales organization. Advertising which has been successful in stirring used car demand will be gathered into a brochure, which will be distributed to all Cadillac dealers.

Copy and layouts for advertisements will be prepared in the advertising department and will be mailed to dealers with the suggestion that these be tried in developing used car buyers. Dealers will also be notified that advertising matter will be written to meet particular local conditions, if requests for such matter are sent to the factory.

GARY TRUCK BUYS CHASE, CANADIAN

Toronto, Ont., Nov. 5—Chase Tractors Corp. has sold its assets to the Canadian Gary Truck Co., a subsidiary of the Gary Motor Truck Co., Indiana. The consideration in the deal is said to be in the neighborhood of \$1,400,000, although the payment is not all in cash.

The new Canadian Gary Truck Co. will have an authorized capital of \$4,500,000.

WHEELING SHOW SUCCESS

Wheeling, W. Va., Nov. 5—Here in this manufacturing and mining center, with 200,000 people within a radius of 50 miles, the first enclosed car show of the Wheeling Automobile Dealers' Assn., held in October, was a great success. The show was under the management of George M. Ford. There were 43 automobiles of various makes and models on display.

Truck Transportation Main Stay in Dire Emergencies

Government Perfects Motor Vehicle Mobilization Plans to Hold Good in Future Need

WASHINGTON, Nov. 5—Plans of the Federal Emergency Organization for the movement of necessities, as made public by Secretary of Commerce Hoover, show that the motor truck was the key-stone of the government's transportation plan, had the railway strike materialized. The Motor Transport Division was created, with W. T. White, of the White Truck Co., as chairman, and Gordon Lee, chief of the automotive section, Department of Commerce was to be assistant to the chairman.

The plan of operation drafted for the emergency will undoubtedly hold good in the event of a similar condition arising in the future. The organization was to have had headquarters in this city, with its primary object the handling of interstate and interregional problems, and all other activities were to be left to the local initiative of governors' organizations. The program called for the determination of the primary, secondary and tertiary stocks of food, fuel and feed throughout the country—primary stocks being those available within state radius; secondary being those within interstate water and motor radius, and tertiary being those within interstate rail and water radius.

It was also planned to determine the areas dependent upon interstate movement for supplemental supplies. Furthermore, it was believed advisable to ascertain the character of movement, whether by water, rail or truck, required or available.

The federal authorities, after a series of conferences, arrived at the conclusion that trucks should head the list of transportation units. In addition to the federal survey, they planned to have each locality make its own survey of commodities and the transportation problem. One of the significant features of the plan shows that the utmost reliance was placed upon the efficiency of truck operation. The official report of the plan as distributed to the state organizations this week contains statements that two alternatives would be apparent in the service; first, that the railways cease operation and that reliance be placed solely upon trucks and water, and second, that limited operation of railways be maintained.

The Department of Commerce plans to supply graphic maps to state committees, showing primary reserves of each commodity available without movement. They intend also to make known the secondary reserves which could be obtained by motor and water movement. The plan called for the establishment of priorities on commodities. It was the idea of the department to make reports to individual

(Continued on page 31)

Durant Claims \$31,000,000 In Sales at Cost of \$15,416

**Sales Manager Leahy in Affidavit
Says 30,842 Cars Were Sold
From Aug. 4 to Oct. 22**

NEW YORK, Nov. 5—Durant Motors, Inc., has made public a remarkable affidavit signed by M. B. Leahy, general sales manager of the Durant Motor Co. of New York, which controls the manufacture and sale of Durant cars for the New England and Atlantic coast territory.

In his affidavit, Leahy says that although the first Durant car was not placed on exhibition until Aug. 4 last, he had received at the close of business Oct. 22 a total of 24,817 shipping orders, based on signed contracts with deposits received by him for the four-cylinder car and 6025 contracts for the six-cylinder car, a total of 30,842. The contracts specified deliveries dating from Nov. 1 up to July 31, 1922.

Leahy declares that this business, approximating \$31,000,000, was obtained without the assistance of traveling men and that the total expense, including both sales and service departments, was \$15,416, or an equivalent sales cost of one-twentieth of one per cent.

The assertion is made by Leahy that in his judgment the territory covered by the Durant Motor Co. of New York will produce a volume of business requiring the production of 140,000 automobiles in the next nine months.

MEET AT BOWSER PLANT

Fort Wayne, Ind., Nov. 5—In order that the personnel of the S. F. Bowser Co. of this city, manufacturer of oil tanks and pumps, and the personnel of the Richardson-Phenix Co., Milwaukee, which has been acquired by the Bowser company, be given an opportunity to get acquainted, a get-together conference was held at the home office of the Bowser company here.

Heading the delegation from Milwaukee was J. William Peterson, former president of the Richardson-Phenix Co., who is now vice president of the Bowser company. Included in the number of visitors were salesmen and office managers of the Richardson-Phenix company.

FAREWELL DINNER TO GRAHAM

Buffalo, Nov. 1—Officers, representatives of the board of directors and executive heads of the sales and manufacturing departments of the Pierce-Arrow Motor Car Co. gathered at the Ellicott Club recently to bid goodbye to George M. Graham, vice president of the company. Graham has resigned to accept the vice presidency of the Chandler Motor Car Co., Cleveland, taking charge of the sales and advertising divisions. More than 200 men were present.

"I am leaving the Pierce-Arrow Co. at the top of my belief in it," said Graham.

"I know that Pierce-Arrow faces even greater achievements than ever before, but I feel that there will be a quicker accumulation for me in the field of quantity production."

Col. Charles Clifton, chairman of the board of directors, expressed the regret of his association and of the company organization at the departure of Graham, declaring that he had won a national reputation during his five years of residence in Buffalo.

Klingensmith Prices Gray Car at Approximately \$500

Detroit, Nov. 5—F. G. Klingensmith, president of Gray Motor Corp., and former treasurer of Ford Motor Co., has officially announced that the new Gray car will be priced at approximately \$500 in the open models and will be in production following the first of the year. Associated with Klingensmith in Gray Motors is Frank F. Beall, former Packard vice president.

The Gray car will be shipped in knockdown condition to 12 assembly points in the country.

The engine and parts will be made in the Gray plant here, which is to be enlarged. The Gray car has been in development for more than a year, its introduction being deferred until the market was considered satisfactory.

The car follows usual lines, having a four-cylinder engine, and will be made so as to be readily assembled. It will have a 100 in. wheelbase and be made of alloy steel. The company is capitalized at \$4,000,000, which is said to be the nucleus of a planned \$350,000,000 corporation.

COURT HOLDS REPUBLIC CONTROL

Cleveland, Nov. 5—Federal Judge Westenhaver has issued an order permitting operation of the Republic Tire & Rubber Co. of Youngstown and Canton under the receivership until further orders of the court. He declined to order continuance of the receivership for a year. The receivers are directed not to make contracts for fabric and other materials more than six months ahead.

DEALERS IN PENNSYLVANIA

Harrisburg, Pa., Nov. 5—Automobile licenses in Pennsylvania show that the state has 2428 passenger car dealers, 251 truck dealers and 2098 accessory and supply dealers. Through these concerns Pennsylvania has contributed a large share of the finished products of the industry, which reached the volume of \$3,594,814,620 in 1920.

In a recent number of MOTOR AGE the address of the Edward A. Cassidy Co., Inc., was given as 280 Madison Ave., New York City. This company is located at 25 West 43rd street, New York City.

The Edward A. Cassidy Co. is the sales agent for the Aircro ignition gage.

France Officially Claims 236,148 Motor Vehicles

**Number Increases 19,360 Since
1914; Commercial Trucks Popular but Growth Not Known**

PARIS, Oct. 29—France had 236,148 automobiles of all kinds in service during the year 1920, according to government statistics just issued. These figures do not include two-wheelers, of which there are about 30,000, nor motorcycles with sidecars, of which there were 5,458, nor 814 cyclecars. These 236,148 automobiles are divided as follows:

Privately-owned passenger cars	135,266
Privately-owned automobile trucks	72,649
Public service passenger-carrying automobiles	21,038
Public service automobile trucks	6,418
State-subsidized automobiles	777
	236,148

This is the first occasion on which complete statistics have been available on the number of automobiles in France, for until 1920 only privately-owned passenger cars paid direct taxation and were included in the governmental statistical returns. In 1914, the last year under normal conditions, there were 115,906 privately-owned passenger cars in service in France, the increase for this class of vehicle, therefore, being 19,360. There are no means of ascertaining the increase in the number of trucks, for comparative figures do not exist. The growth, however, is considerable.

The official returns show that the section of France possessing the greatest number of automobiles is the Seine Department, including the city of Paris and immediate surroundings. This district had 36,282 passenger cars and 20,262 trucks in service last year.

LOCOMOBILE BOSTON ACCOUNT

Bridgeport, Nov. 5—Officials of the Locomobile Co. of America are considering taking over the Locomobile account there handled by the Hare's Motors Co., of Boston, which went into bankruptcy last week on petition of three creditors having claims of \$8,000. The company handled the Mercer and Saxon also. It is expected that some plan may be worked out whereby the Locomobile company will take back again its big building on Commonwealth avenue, where it had a branch for years, until the Hare's Motors was formed a year ago.

WINTER SERVICE CAMPAIGN

Bloomington, Ill., Nov. 7—Central Illinois garage owners are planning a winter repair business. They are urging car owners to have their machines overhauled and repaired when the business is at the lowest ebb and when there is plenty of time for this attention. There will be a better job and no loss of the car from service.

Firestone Extends Dealers 20% Discount Indefinitely

**Other Big Makers Expected to Meet
Reduction, Although Making
Present Denials**

AKRON, Nov. 7.—The Firestone Tire & Rubber Co. has announced that it has made a 20 per cent reduction in prices on cord tires, 10 per cent on fabric tires and 10 per cent on truck tires. This gives all tire purchasers the advantage of a 20 per cent discount offered to dealers some time ago, effective until Oct. 31. The announcement evidences a sudden change of front by the Firestone company, which stated Oct. 31 that it did not contemplate continuing the 20 per cent discount which had been given to dealers.

It is considered probable that the other large tire manufacturers will be compelled to take similar action in order to meet competition, although there is said to be a possibility they may decide to let Firestone go it alone.

President E. G. Wilmer of the Good-year Tire & Rubber Co., who declared Oct. 31 that he knew of no plan on the part of the larger tire companies to announce a general tire reduction, says that nothing definite has been done to meet the Firestone reduction. A similar statement was made in behalf of the B. F. Goodrich Co.

New York, Nov. 7.—Tire companies with headquarters in this city are understood to be going over their schedules with the expectation of meeting the Firestone reduction, but the formal announcement will not be made until later in the week.

Kelly Springfield Company has made downward revision on prices of pneumatic casings, truck tires and tubes. Reduction on cord tires is 20 per cent; on fabrics, 10 per cent; caterpillar truck tires 15 per cent, standard truck tires 10 per cent and tubes fluctuate from 10 to 20 per cent.

LAW THREATENS HEAVY LOSS

Bridgeport, Conn., Nov. 5.—Connecticut automobile repairmen unfamiliar with recent statutes passed by the state legislature are in danger of losing thousands of dollars, if the supreme court of errors at its January session sustains a section of the public acts of 1921, which provides that written authority to make expenditures beyond \$50 for repairs on cars must be secured before the work is done. A test case, Quigley vs. Mattice, will be tried before the highest state tribunal.

EXHIBITORS AT TRACTOR SHOW

Minneapolis, Nov. 7.—The following companies will be represented at the annual tractor show and demonstration and power farming machinery exhibit here Feb. 6-11:

American Fruit Grower, Aro Manufacturing Co., Avery Co., Advance Rumely Thresher Co., Aultman Taylor Machinery

Co., Bates Machine & Tractor Co., C. L. Best Tractor Co., Bryan Harvester Co., J. I. Case Threshing Machine Co., Cleveland Tractor Co., Clark Turner Piston Co., Clarke Publishing Co., Dakota Farmer, Gray Tractor Co., Inc., Gurney Ball Bearing Co., Hart-Parr Co., Holt Mfg. Co., Hyatt Roller Bearing Co., Midwest Engine Co., No-Leak-O Piston Ring Co., Port Huron Machinery Co., Simms Magneto Co., S. K. F. Industries, Standard Oil Co., Vortox Mfg. Co., Wagner Langemo Co., Waukesha Motor Co., Oliver Chilled Plow Works, Twin City Co.; Stromberg Motor Devices Co., Timken Roller Bearing Co., Fafnir Bearing Co., K-W Ignition Co., Link-Belt Co., Implement Age Co., Bassick Mfg. Co., Standard Steel & Bearings, Inc., Ironsides Co., Splittdorf Electric Co.

Miniger of Willys Corp. to Join Durant Motors, Inc.

New York, Nov. 5.—Clement O. Miniger, vice-president of the Willys Corp., as well as president and general manager of the Electric Auto-Lite Corp., will sever his connection with the Willys organization some time between now and Jan. 1 to become associated with W. C. Durant in the management of Durant Motors, Inc. No formal announcement of Miniger's plans has been made, but he will be a director of several Durant subsidiaries, including the Durant Motors Co. of Canada, Ltd.

Miniger ranks next to Walter P. Chrysler and J. R. Harbeck in the Willys corporation. He is credited with much of the success of the Electric Auto-Lite Corp., which has had a comparatively satisfactory business all through the period of depression and is now in a highly satisfactory position.

There are reports, as yet unconfirmed, that another prominent figure in the automotive industry soon to join Durant will be Hugh Chalmers, who gained wide fame with the National Cash Register Co. before he entered the automotive field. His last active work in connection with automobiles was with the Chalmers Motor Car Co., which now has been merged with the Maxwell Motors Corp. He was president of the Chalmers company until the reorganization in 1918, when control was acquired by J. S. Bache & Co., bankers.

Tipton, Ind., Nov. 5.—Formation of an automotive dealer organization was started here in October. Leaders in the Indiana Automotive Trade Assn. addressed the meeting and will aid in the formation of the association.

October Shipments Were 96 Per Cent of Year Ago

**Distribution for Month Shows Only
11 Per Cent Decline Compared
With September**

NEW YORK, Nov. 7.—Reports of October shipments of passenger cars and trucks, as compiled by the National Automobile Chamber of Commerce, show that they aggregated 96 per cent of the total for the same month last year. It was the first month since the liquidation really got under way that shipments reached virtually the same level as in the same period a year previous. There is every reason to believe the comparison will be more favorable from now on. Gratification also is felt that October shipments showed a decline of only 11 per cent, as compared with last month. Shipments for October of last year were 26 per cent less than for September. The shipment figures by months for this year and last will be found in the accompanying table.

CURTISS JOINS TIFFANY CO.

Newark, N. J., Nov. 7.—C. W. Curtiss, formerly general manager of the Splittdorf Electrical Co. and later president and general manager of the Van Sicklen Speedometer Co. until its sale to the Stewart-Warner Speedometer Corp., has taken a substantial interest in the Tiffany Manufacturing Co. of this city, of which he has been elected president.

Associated with him are Paul J. Landemare, secretary and treasurer, formerly treasurer of the Splittdorf company and later controller of the Van Sicklen company, and Carl T. Mason, chief engineer, formerly chief engineer of the Splittdorf company. The Tiffany company manufactures a line of high-grade automotive electric specialties.

ATLANTA ENCLOSED CAR SHOW

Atlanta, Ga., Nov. 5.—Atlanta will have its first enclosed car show this fall during the last week in November. Whether or not the show will be held at the new Lulwater building or individually by the various dealers in their display rooms, has not been definitely decided. C. V. Hohenstein, secretary of the association, sent questionnaires to all dealers as to their preference in this regard, and the majority rule will prevail.

CAR SHIPMENTS FOR FIRST 10 MONTHS OF 1920

	—Carloads—		—Driveaways—		—Boat—	
	1920	1921	1920	1921	1920	1921
January	25,057	6,485	29,283	3,185	.....	93
February	25,505	9,986	43,719	7,507	.....	99
March	29,326	16,287	57,273	9,939	.....	75
April	17,147	20,187	64,634	14,197	.....	1,619
May	21,977	18,608	74,286	15,193	.....	2,381
June	22,516	20,269	60,746	18,834	8,350	3,947
July	23,082	19,470	53,342	15,320	8,702	3,725
August	23,386	20,350	34,060	14,290	7,095	3,565
September	20,804	20,150	24,431	13,550	5,469	3,580
October	17,209	17,323	14,127	11,257	2519	2,300

CONCERNING MEN YOU KNOW

Clinton Hunter, for the last six years associated with the Studebaker retail organization in Chicago, has been appointed sales manager for W. C. Garbe, Inc., Portland, Ore., Studebaker dealer.

Frank H. Cole, president of the F. H. Cole Motor Car Co., Bloomington, Ill., has been taken home from a Chicago hospital where he has been a patient for nine months, following a fall down an elevator shaft at his garage. He is founder and vice-president of the Automotive Dealers Assn. at Bloomington.

B. R. Kline, Seattle, Wash., has bought the entire stock of the Whitestone Tire & Rubber Co., and will continue in the tire business under the name of Ben Kline, distributor of United States and Goodyear tires.

A. Z. Polhamus, for the last year president of the Visible Pump Co., with offices in Fort Wayne, and a plant at New Haven, Ind., has resigned. S. B. Rohrer, who for some time has been connected with the company as first vice-president and treasurer, has been elected president.

William F. Cornell, for many years connected with the Federal Truck Co., was buried in Kalamazoo last week. He headed an agency handling a Ford appliance, when taken fatally ill. His home was in Detroit.

Don Livingston, sales manager of the Federal Truck Co., St. Louis, at the convention of Federal truck distributors and officials at the Federal factory in Detroit, Oct. 21-25, was elected president of the Federal All-Star Club.

P. E. Chamberlin addressed the members of the Hartford Automobile Dealers Assn. in a series of four classes recently.

L. B. Southerland, former sales manager, has been named general manager of the Chicago Branch of the Cadillac Motor Car Co., effective immediately. Southerland has been connected with Cadillac sales organizations for 12 years, his first experience dating from the four-cylinder days in 1909.

Goodyear Tire & Rubber Co. announces the appointment of Burgess Darrow as development manager and R. P. Dinsmore as chief compounding, following the resignations of W. S. Wolf and W. P. Keith. The resignation of K. B. Kilborn as experimental engineer, to be succeeded by V. V. Messer, has also been announced by Goodyear.

Dan P. Shaw has been secured as manager for the Ohio Piston Co., Cleveland, O.

F. M. Benson, formerly connected with the sales departments of the Chevrolet Motor Co. and the Sheridan Motor Car Co., has left the General Motors Corp. to organize the Benson Motor Car Co. of New York, which will distribute Bell trucks in the eastern territory, including New York and the New England states. The company will specialize in one-ton trucks and will build up a dealer organization throughout this territory.

Guy Mobern, Piper City, Ill., owner of a garage, was killed when his automobile collided with a small bridge near Cullom.

W. H. Goodwin, of Portland, Ore., for the past few years assistant manager of the Ford Motor Co.'s branch in Seattle, has been made manager of the Portland branch for the Ford. He succeeds S. A. Stellwagen, who recently was promoted to the Ford branch at Omaha, Nebr.

With 1915 as Index, Ford Says Business Is Normal

Buffalo, Nov. 7—"Business conditions are improving everywhere."

This was the statement made by Henry Ford during his visit to this city recently.

"Unemployment today is a problem created by the manufacturers," said Ford. "Many manufacturers who became rich during the war are now too lazy to open their factories."

But the manufacturers claim that they have decreased production because the demand has diminished, Ford was told.

"No," replied the automobile manufacturer, "the trouble lies with the manufacturer who is neglecting to sense the public's wants. The manufacturers are lazy."

"Business is picking up; we are coming back to normal. It is difficult to say just what normal is, but the year 1915 might be called normal. In that year wheat was selling for \$1 a bushel. That is what wheat is selling for at this time."

GOODYEAR PROSPERS THROUGH DEALERS

Akron, Nov. 5—The General Tire & Rubber Co. has paid its last bank indebtedness and starts the new year without one cent of unfunded debt. The final payment was made Oct. 20.

The company has had exceedingly good business during the year, as is shown by General Manager O'Neil's statement that production for the year will be 30 per cent in excess of the record of 1920. The gross sales will be very close to the 1920 record. The fact that gross sales will equal but not exceed the sales for the previous year in spite of largely increased production, is due to the fact that tire prices were

materially reduced during last winter and spring.

The continued prosperity of Goodyear is attributed by the officers to the fact that the company has virtually confined its business to dealers rather than take on a large amount of original equipment business. Dealers' business continued to hold up well during the past year.

MICHIGAN ADOPTS SIGNAL TRUCK

Detroit, Nov. 7—The Signal Motor Truck Co., a Maine corporation for which a receiver was appointed in Portland on Aug. 17, will be reorganized this week as a Michigan corporation. It is learned that the property of the company was taken over Oct. 26 by a former officer as an individual pending the reorganization. The new company will retain the same name and there will be no change in its products.

The petition for a receiver was filed by Milton B. Hoagland, vice-president and general manager of the company, in accordance with a vote of the stockholders. J. G. Heaslet was president of the old company and H. H. Emmons was secretary.

COOPERATING ON SERVICE

Boston, Nov. 5—J. C. Harvey, New England Haynes distributor, cooperating with his employees for better service, has aided them in forming an organization which aims to make everyone interested in the improvement and success of the service station. Officers were elected as follows: Harold C. Hills, president; Henry Burke, vice president and treasurer; James Lambert, secretary; Charles J. Walsh, assistant secretary. There will be a series of educational lectures during the winter and outings in the summer.

Texas Dealers Campaign for Service With Sales

Branches of Houston Automobile Assn. Will Seek Better Business Throughout Winter

HOUSTON, Tex., Nov. 5—The Houston Tire Dealers' Assn., a branch of the Houston Automobile Assn., reports that excellent results have been obtained from its campaign, inaugurated for the purpose of having automobile owners buy their tires where they get their service and get their service where they buy their tires. Already the members of the association declare the sale of tires has been materially increased, and likewise, the amount of service.

The campaign is being carried on through newspaper advertisements, circular letters, personal calls and solicitation, billboards and motion picture screens. The first part of the campaign was devoted to informing the automobile owners how to determine between "seconds" and first-class tires, and service which stands the test and the brand which proves costly in the end.

The campaign of the association will probably be continued throughout the winter and will go into details of the tire business from all angles, as well as the service business. The advertisements are being carried jointly by the association.

The association is meeting weekly to discuss results of the campaign and map out plans for reaching all car owners with the most persuasive line of argument. The advertisements do not advocate the buying of any particular line of tires from any particular dealer. They just suggest buying tires where the service is had and give reasons. Other branches of the Houston Automobile Assn. are watching the results of the campaign and there is some talk of these branches launching similar campaigns later on.

BUY AT HOME CAMPAIGN

Amarillo, Tex., Nov. 5—The Panhandle Automobile Assn., an organization of retail automobile dealers, with members in a score of cities like Amarillo, Painsview, Lubbock, Dalhart, Lamesa and other places, has started a campaign of "buy your automobiles and trucks at home." The campaign is being conducted through newspaper advertising and circular letters and is calculated to turn a flood of automobile business which has been going from the Panhandle section of the state to the big cities, back to the dealers in the smaller cities.

REPUBLIC TRUCK ASKS EXTENSION

New York, Nov. 7—The Republic Motor Truck Co. is mailing to noteholders a request for an extension until 1926 on \$500,000 of its \$2,500,000 seven per cent notes which matured Nov. 1. The request is made because of business conditions, which have not permitted liquidation of sufficient inventories.

BUSINESS NOTES

Greger-Fisher Auto Equipment Co., Dayton, O., has been incorporated with a capital of \$75,000 to manufacture accessories and parts. Incorporators are J. E. Fischer, R. A. Greger, C. G. Weigand, W. F. Harn and J. R. Kling.

Mankin-Ferris Co., Akron, O., has been chartered with a capital of \$75,000 to deal in automobiles, supplies and accessories. Incorporators are C. E. Mankin, H. E. Ferris, J. A. Russell, K. Griffiths and Alma W. Norton.

Toledo Bus Transportation Co., Toledo, O., has been chartered with a capital of \$100,000 to operate several lines of motor buses in Toledo and surrounding territory. Incorporators are Frank J. Westhoven, Howard W. Tassell, Ross R. Herlocker, Ernest Kureach, Guy N. Henton, Harry A. Schinhl, Joseph E. Tanher and others.

Controllable Automobile Light Co., of Jacksonville, Ill., has been organized by C. F. Anderson, J. R. Mitchell, and P. E. Dehr, and will manufacture a new type of headlights and spotlights for motor vehicles.

Ohio Piston Co., Cleveland, is placing on the market a complete line of replacement pistons which meet factory specifications.

Karl T. Muehlberg, Manitowoc, Wis., designer and patentee of a new type of reaming and boring machine for engine cylinders, has organized the business as the K. T. Muehlberg Co. of Manitowoc, with a capital stock of \$60,000.

Federal Rubber Co., Cudahy, Wis., division of the Fisk Rubber Co., has recently increased the rate of operations to approximately 65 per cent of capacity.

Manufacturers Find Dealers Ready to Talk Contracts

(Continued from page 25)

Dry single plate, 31 per cent.

Four-speed gearsets, 51 per cent.

Hotchkiss drive, 48 per cent.

Spiral bevel gears in axles, 67 per cent.

Worm drive, 13 per cent.

Both brakes on rear wheels, 51 per cent.

Brakes on transmissions and wheels, 39 per cent.

Front wheel brakes, 10 per cent.

Wire wheels, 29 per cent; disk wheels, 28 per cent; hollow spoked wheels, 26 per cent; wood wheels, 17 per cent.

British trends indicate little change in the number of cylinders except an increase in the number of two-cylinder cars. The overhead valve engine has increased from 21 to 24 per cent. The pump system and thermo-syphon of cooling are still the same as to the number of makers using them, this being about fifty-fifty. There is a tendency now for makers to use radiator shells of white metal, not plated. Last year there were five such radiators shown and this year 31. Seven more makers are using aluminum pistons.

Twenty per cent of the new models have batteries. Of 24 new chassis, 10 are fitted with unit power plants. The amidships gearset appears in unit with the torque tube on five models and in unit with the axle on two models. The cone clutches have decreased from 61 to 52 per cent, while the single plate clutch has increased from 27 to 34 per cent.

Other percentages are as follows: 3-speed gearsets, 50 to 58; Hotchkiss drive remains 46; fabric universals, 28 to 40; spiral bevel gears, 46 to 50; both brakes on rear wheels, 61 to 67. There are only four cars showing external band brakes on the rear wheels, all the others

being of the internal type for both service and emergency brakes.

The quarter elliptic spring has increased from 16 to 20 per cent; cantilevers are holding their own at 22 per cent. Hollow spoked wheels have gone from 50 to 48 per cent. No British car maker has yet standardized straight side tires, although several may do so when the wheel stock diminishes. No British car in production has front wheel brakes, nor does there seem to be any apparent demand for this construction. There seems to be more and more use made of cables for brake operation. There are several new aluminum axles and three new aluminum engines. The Vauxhall four has an aluminum L head engine with cylinder 3 by 5½ in., magneto ignition, unit power plant, 3-speed aluminum axle with four-passenger body.

The new Sunbeam four-cylinder has an aluminum cylindered engine with steel liner valves overhead. This car has a unit power plant, 3-speed gearset, and four-passenger body. The price is \$3,625. The Standard has increased its engine and chassis dimensions of the 11-horsepower, 4-cylinder overhead valve job, but introduces a new 67 cu. in. job with a mechanical starter and a two or four-passenger body, optional. It is priced at \$1,615.

Armstrong Siddeley has a new six, supplementing the 30-horsepower car. It is of the same design with small modifications. The engine is 2¾ by 4¾ in., priced at \$4,000.

The new Singer is the smallest British six-cylinder car and sells for \$3,375.

The two-passenger Wolseley is a new model incorporating a water-cooled, horizontally opposed twin cylinder engine of 58 cu. in. piston displacement. This is a very high grade car, has a mechanical starter and is priced at \$1,550.

The new two-passenger B. S. A. representing the Daimler interests has an air-cooled 65 cu. in., 90 deg. twin engine, electric starter, and costs \$1,700, comparing unfavorably with the eight-horsepower Rover at \$1,100, despite the better equipment.

Armstrong Siddeley's other new model is not at Olympia nor yet in production. This car has a 90 deg., air-cooled engine with inverted cloverleaf type of body, affording a centrally located steering column. This is to sell at \$1,125. Numerous other makers have set out to compete with the little Rover, but so far there is nothing that would indicate inroads on what is almost a monopoly in a new field.

PIERCE-ARROW DEFICIT \$4,000,000

New York, Nov. 7—A report of the Pierce-Arrow Motor Car Co. for the quarter ended Sept. 30, shows a deficit of \$2,109,999 after charges, depreciation and federal taxes. This compares with a deficit of \$1,400,550 in the previous quarter and surplus of \$355,310 in the corresponding quarter of 1920. The deficit for the nine months ended Sept. 30 amounted to \$4,000,051, compared with a surplus of \$1,778,354 for the corresponding period last year.

Maibohm Reorganization to End Receivership Nov. 14

Disastrous Fire at Old Plant in Racine, Wis., Said to Be Responsible for Difficulties

TOLEDO, Nov. 5—Efforts to save the Maibohm Motors Co., Sandusky, through a reorganization were the basis for a petition in bankruptcy filed in Federal court here Oct. 28. The assets of the company are listed at \$759,124 and debts at \$681,640.

Judge John M. Killits appointed W. J. Corr, secretary of the company, as receiver, with power to continue the business. The property of the company was ordered sold.

A creditors' committee filed a similar petition with a plan for refinancing attached. Edward Kirby, of the Commerce Guardian Trust & Savings Bank, Toledo, is chairman of the committee. The plan is to pay outstanding indebtedness with the proceeds of an issue of preferred stock.

Difficulties of the company are said to be due to efforts to recover from a disastrous fire which swept away the plant at Racine, Wis., before the company moved to Sandusky.

A statement issued by the Maibohm company says that "unless unforeseen obstacles arise, the receivership will terminate Nov. 14 and the reorganized company will take charge." It is stated that there will be no interruption of manufacturing operations.

The Maibohm Motors Co. was incorporated in Maine in 1917 as the successor to a company of the same name incorporated in Delaware a year earlier to take over the business and assets of the Maibohm Wagon Co. and Maibohm Rubber Co.

The authorized capital stock is \$2,500,000, of which \$1,780,000 is outstanding. There is no funded debt. Gross sales for the year 1920 were \$1,897,658. The surplus for the year after payment of taxes, etc., out of the profits \$51,503, was \$2213.

H. C. Maibohm has been president of the company since its organization and recently has acted as general manager.

The plant of the company at Racine was burned Dec. 31, 1918, and it was decided to accept an offer from the city of Sandusky of 15 acres of land with a cash bonus of approximately \$100,000. The new plant in that city has 75,000 sq. ft. of floor space.

WILCOX BUYS CONTROL

Minneapolis, Nov. 5—The Wilcox Trux, Inc., has acquired the interest of F. E. Satterlee as receiver of the H. E. Wilcox Motor Co., by purchase of the assets of the receivership. All future business in connection with the manufacturing, sale and service of Wilcox trucks will be handled by the new corporation at its offices in Minneapolis.

Associated Motors to Hold Members Secret Until Jan. 1

Merger Includes 19 Automotive Companies with Assets Approximating \$65,000,000

NEW YORK, Nov. 5—Incorporators of the Associated Motor Industries, which, it was announced last week, would take over the Jackson Motors Corp., do not contemplate making public the details of the merger which will take in 19 automotive companies with assets of approximately \$65,000,000, until early in January. It is explained that, while the officers of the various corporations which will be included have signed contracts, it will be necessary to obtain the consent of a majority of the stockholders in each corporation. Satisfactory progress is being made in this work, but inasmuch as there are several hundred stockholders in some of the companies, it will require a considerable period to complete the negotiations.

SHERMAN ON SOUTHERN TRIP

Chicago, Nov. 5—Ray W. Sherman, merchandising director of the Automotive Equipment Assn., was in Kansas City this week, where he delivered an address before a meeting of dealers. Leaving Kansas City, he was in Waco, Tex., Nov. 7, Dallas on the 8th, San Antonio on the 9th, Houston on the 10th and will be in Memphis on the 11th, when he will meet with the Southern Automotive Equipment Assn.

Sherman says that the campaign for more sales is rolling up big and that the industry is giving it splendid support.

Oct. 29 Sherman told his story to 150 salesmen traveling in the Chicago district. They were very enthusiastic and promised hearty cooperation.

GILL ISSUES SIZE BOOK

Chicago, Nov. 5—A comprehensive compilation of engine facts is contained in the size book just issued by the Gill Mfg. Co., 8300 So. Chicago Ave., Chicago.

This book of 140 pages is practically a record of the internal combustion and the smaller Diesel engines. These engines are listed by make and include in the list many orphan automobile engines. The engines listed are those of the automobile, truck, tractor, marine, aeroplane and industrial and stationary air compressors. The information given of each is the number of cylinders, piston rings and the piston ring size required for each.

The book has been well circulated throughout the trade, but additional copies are offered to those interested.

WILLYS REDUCES DEBT

New York, Nov. 5—The Willys-Overland Corp. yesterday paid off in cash 10 per cent of its maturing bank loans of \$18,000,000. The balance has been renewed for eight months. Bankers for the

corporation say that the concern is in a comfortable cash position.

It is understood that entirely satisfactory progress is being made in the program for refinancing the Willys corporation. Details now are being worked out under which it is expected a banking syndicate headed by Kuhn, Loeb & Co. will underwrite a note issue of approximately \$20,000,000. Business of the subsidiary companies within the corporation is steadily increasing and has been in satisfactory volume for some time. There are unofficial reports that operations will be started in the near future in the huge new Chrysler plant at Elizabeth, N. J.

11 Tractor Manufacturers Reduce Prices on 13 Models

Chicago, Nov. 5—The following reductions in the prices of tractors have been announced by the various manufacturers, effective immediately.

Name—	Old Price	New Price
A R O.....	\$550	\$495
Aultman (22 to 45 rating).....	3,850	3,420
Aultman (30 to 60 rating).....	5,000	4,500
Caterpillar (25 rating).....	4,250	3,975
Caterpillar (40 rating).....	6,500	6,050
Centuar	405	385
Dart	2,100	1,800
Imperial	5,000	4,500
Kalumb	1,650	1,475
Peoria	1,785	1,600
Plowman	1,995	1,695
Port Huron	1,700	1,600
Allwork Model 2 G.....	1,875	1,775
Allwork Model C.....	1,675	1,525

CHALMERS PRICES DROP

Detroit, Nov. 7—The Chalmers Motor Car Co. has announced price reductions on its various models ranging from \$150 to \$400. The price revisions are as follows:

	Old Price	New Price
Roadster	\$1495	\$1245
Five-passenger touring.....	1545	1295
Seven-passenger touring.....	1795	1395
Coupe	2295	1995
Sedan	2445	2295
Sport	1695	1445

WILCOX LOWERS PRICES

Minneapolis, Nov. 5—The Wilcox Trux, Inc., has made reduction in price on all its models as follows:

	Old Price	New Price
1-ton	\$2100	\$1900
1½-ton	2775	2550
2½-ton	3300	3000
3½-ton	4250	3950
5-ton	5200	4350

COMMERCE TRUCK REDUCES

Detroit, Nov. 5—The Commerce Motor Car Co. announces prices on the new Commerce truck as follows: 1½-ton (pneumatic equipped), \$1,450; 1½-ton, \$1,695; 2-ton, \$1,995; 2½-ton, \$2,150. Pneumatic equipped, the three latter are \$1,800, \$2,150 and \$2,495, respectively.

Truck Transportation Mainstay in Dire Emergencies

Government Perfects Motor Vehicle Mobilization Plans to Hold Good in Future Need

(Continued from page 26)

organizations as to truck transportation available and truck mobilization for long and local hauls.

Assuming that railroad operations ceased entirely, it was pointed out that all towns and cities outside of the "dense area" could supply themselves by motor or water for at least 60 days without any consequential interstate movement. The "dense area" comprised New England, New York, New Jersey, Delaware, Maryland, Pennsylvania, Ohio, Indiana and Illinois. It was suggested that steps be taken by the local authorities in anticipation of any difficulties to supply gasoline.

The Department of Commerce declares that two primary changes in the situation from pre-war conditions are to be noted: first, by war experience the country understands the whole process of civilian and industrial organization to meet emergencies; and second, the motor truck has given every town an extended radius of food supplies by some 50 miles and insures delivery of perishables.

The automobile industry has been much concerned over the mobilization points which the government would select in the event of a strike. The Department of Commerce divided the country into regions under regional representatives, the first region covering the New England states centered at Boston; the states of New York, New Jersey and Delaware centered at New York City. In the middle west, Chicago was the mobilization center selected. It was not determined whether Washington or Pittsburgh would be the center for Maryland, Pennsylvania, Ohio, Virginia, West Virginia and Kentucky. Atlanta, Ga., was selected as mobilization headquarters for the states of Tennessee, North Carolina, Mississippi, Alabama, Georgia, South Carolina, Florida and Louisiana. Kansas City was selected as the center for the states of Nevada, Colorado, Kansas, Oklahoma, Missouri and Arkansas, while Houston, Tex., was to be the point of mobilization for Texas and New Mexico. For the states of Arizona, California, Nebraska and Utah, San Francisco was selected as the central point. Seattle was selected as the mobilization point for Idaho, Oregon and Washington, while Aberdeen or Pierre was chosen for Montana, Wyoming, North and South Dakota.

The administrative section of the plan called for the assistance of governors and their state organizations in securing interstate movement of the supplemental necessities that they might require, and to set up relations with food and fuel industries to assist in interstate or inter-regional movements of supplies, and also to secure coordination of railway and water movement in the delivery of these necessities to points in need.

New Models and New Prices Stimulate Car Production

Anticipating Continued Brisk Fall Business, Detroit Factories Will Not Cut Schedules

(Continued from page 24)

November production in this line will approximate October's. Truck business in November will show an increase of 100 per cent over October, which likewise had shown gains over previous months. Increases in truck sales are looked upon by the company as a favorable augury of the revival of general business.

Other cars in the better class field report similar conditions. Cadillac is continuing on its high production schedule of the new models. Lincoln reports an October business on a par with September. Roamer is continuing in strong demand and officials look for steady business for the rest of the year.

Medium-priced cars have been most affected by the fluctuations, factories reporting a reticence on the part of the dealers to do any stocking, but, despite this, sales are running strongly. Hupmobile, with a price reduction restoring 1917 levels, looks for heavy business in November after a somewhat static October.

Buick and Studebaker continue to lead in their field, October business showing a slight falling-off, however, from the earlier production marks, and November will show a still further curtailing. Reo reports business as steady and satisfactory. Oldsmobile will continue at about the October pace. Hudson-Essex, with new models in the first and lower prices in the latter, report sales running high in comparison with earlier months.

Earl Motors has fixed a schedule for 500 of the New Earls in November, in addition to which they will manufacture Briscoe to meet the sales in this former model. Maxwell has not fixed a manufacturing schedule for its new line, but orders are reported running very high and heavy business is looked for.

Dodge continued in October its schedule of 550 cars daily, and is starting November on approximately the same schedule. Dort will continue its October schedules. Saxon reports business better than for several months and looks for steady November sales. Columbia reports good October business and finds the November outlook satisfactory.

CORRECTION

O. D. Tucker IV & Co., of Little Rock, Ark., who recently purchased the stock and good will of the Three A Co., will not do a retail business, as erroneously announced. The firm is strictly wholesale.

PROGRAM COMMITTEE BUSY

Columbus, O., Nov. 7—The board of directors of the Ohio Automobile Assn. is scheduled to meet soon to approve the program for the annual meeting of the

association, which will be held in Columbus the second week in December. The program is being worked out by Secretary Shover of the association, assisted by a general committee, headed by Y. B. Jones. In addition, another committee on the show is functioning, and plans for the large exhibit to be held at the memorial hall during the convention are rapidly maturing. Indications point to a very successful convention.

Royal Six 6-Cylinder Car Is in Production in Canada

Montreal, Nov. 5—A six-cylinder car known as the Royal Six, has been placed in production by the Parker Motor Car Co., Ltd., of this city. The car is assembled from American units and is made in both open and enclosed types. It sells for \$2675 for the two, four and seven-passenger open types; \$3275 for the sport four-passenger type with California top; \$3475 for the four-passenger coupe, and \$3675 for the seven-passenger sedan. All models are on a 126-in. wheelbase chassis.

The engine is a Continental of 3½ by 5¼ in. bore and stroke, the clutch a Borg & Beck, and the transmission a Warner three-speed, while the axles are Columbia. A Zenith carburetor is fitted, ignition is by the Atwater-Kent battery system, and the lighting and starting is by Bijur equipment. Cooling is by means of a cellular radiator with pump and ball bearing fan. The frame is of Z section, 7¾ in. deep and with flanges 2½ in. wide. The runningboards form an integral part of the frame members, being hot-riveted to the bottom flange of these members and also riveted to the vertical section at the front and rear where the runningboard curves up to meet the fenders at the top of the frame. Left-hand steering is used. Five disk wheels with 4½ in. cord tires (non-skid tread for rear) are standard. A very complete equipment is included in the price of the car.

MILWAUKEE TIMER CHANGES NAME

Milwaukee, Nov. 5—Nov. 1, the corporate name of the Milwaukee Auto Engine & Supply Co., Milwaukee, manufacturer of the Milwaukee timer for Fords, was changed to Milwaukee Motor Products, Inc. The change is one of name only—there has been no change in the personnel or policies of the company. The new name was finally decided upon because it was considered simpler and more appropriate to the business.

HAYES WHEEL IN NEW YORK

Jackson, Mich., Nov. 8—The Hayes Wheel Co. has established a service and sales branch at 250 West Fifty-fourth street, New York City, to supply the eastern division and export trade with a full line of Hayes products. Donald Ganiard will be general manager of the branch, assisted by L. J. Curry as sales manager and F. R. Symonds.

Dealer Contracts, Used Car Problem to Occupy N. A. C. C.

Over-Production and Loose Business Methods Recognized As Causes for Cure

(Continued from page 24)

turers as well. After the field has been carefully studied and analyzed, the directors will make recommendations to improve conditions and also recommendations designed to aid in averting a repetition of a similar situation in the future.

It is recognized that part of the present trouble is due to over-production in the past, but it is held that dealers also are somewhat at fault because they have accepted cars in trade-ins when it was not actually necessary to do so. Information is being gathered from all parts of the country as to the actual number of used cars remaining unsold and also full details of the most successful methods adopted in disposing of them. The N. A. C. C. knows that reports of a half million used cars on the market are greatly exaggerated. Although no definite figures are available at this time, it would not be surprising if the number did not exceed 350,000.

Successful Selling Plans Described

Many possible solutions of the problem are being submitted to the N. A. C. C., but most of them, if adopted, would be in restraint of trade. This is one of the most difficult elements in the situation because it will be impossible to take any stand which would cover the entire industry. Much valuable information in regard to successful selling plans is being received, however, and it will be assembled for the benefit of all manufacturers and dealers.

While it is believed much can be done to eradicate the used car evil, the N. A. C. C. does not believe it ever can be cured.

Reports made to the directors indicate that trade in practically all sections of the country was normal for this time of the year and the belief was expressed that a seasonal slowing down of business should be expected from now until after the New York and Chicago shows.

Considerable attention was given by the directors to the big shows this year, and it was made plain by them that they would welcome suggestions by dealers as to how the shows could be made more helpful in promoting the sale of cars and assisting dealers. The N. A. C. C. is seeking a keynote for the advertising which will be used in connection with the expositions this year. The suggestion has been made that it might be advisable to arrange dinners for the dealers who attend the New York and Chicago shows, but there is a feeling that this would do little to advance the sale of cars and that the attention of everyone in the industry should be centered upon this purpose.

IN THE RETAIL FIELD

C. G. Moffat has taken over the Pierce-Arrow passenger and motor truck lines in this territory, succeeding F. F. Reeves, who has been representative of those lines for years. Reeves will be with the same company in another territory.

Arkansas Reo Motor Car Co., Little Rock, will distribute the new Durant car in Arkansas under Joe Bailey, general manager. The company also handles the Peerless in that territory.

Baumann Motor Sales Co., Kalamazoo, N. J. Baumann, manager, has taken the agency for the Hupp Motor Car Co. Associated with Baumann is Robert J. Duffus, former manager of the Kalamazoo factory branch of the Packard Motor Car Co.

R. E. Fair, Ford distributor in Kalamazoo, has formed a partnership with J. L. Larkin and established the Larkin-Fair Co., at Chicago Heights, Ill., selling Fords in that territory.

S. R. Jones, formerly wholesale sales manager for the Velie and Moon Motor companies, has been appointed wholesale manager for the McNiece-Hill Motor Co., Lincoln, and Wills Saint Claire cars.

C. A. Aldrich, St. Louis, formerly president of the Aldrich-Stephen Motor Co., distributor of Oneida trucks, has been appointed city sales manager for the Traffic Motor Truck Corp.

Harry Gordon, Hartford, Conn., has just opened the new Y. D. garage.

Means Sales & Service Co., Towanda, Pa., has broken ground here for a two-story concrete battery sales and service station.

James E. Meredith, Towanda, Pa., has started to build an automobile sales and service structure of two stories.

Traylor Motor Co., Philadelphia, has removed to larger quarters at 252 North Broad street. This concern merchandises the Stephens Salient Six, and the local manager is Austin Hausman.

Norman Chambers, formerly branch manager of the Overland-Harper Co., at Chester, Pa., will supervise the northern division for Willys-Overland, Inc., of Philadelphia, taking in eastern Pennsylvania and southern New Jersey. R. R. Lakey will have charge of the sales of the southern division, comprising Delaware, Maryland, Virginia, Tennessee and North Carolina.

Roundtree-Abbott Co., Houston, Tex., has completed arrangements for handling the Columbia Six in 50 counties in this district. There are now some 200 of the Columbias in the district and the Roundtree-Abbott company announced it expects to place as many more during the next year.

Bailey Motor Co., Inc., Houston, Tex., has taken over the Overland and Willys-Knight agency in the Houston district, the Overland-Houston Co., former distributor, ceasing to exist. The territory includes the cities of Houston and Galveston. Members of the new company are J. R. Bailey, J. T. Scott and Henry Mayfield.

League Electrical Co. is the newest automotive concern in Houston. It was organized this week. The credit and sales department is in charge of F. A. Pidgeon and the service and shop department is in charge of J. Inglis.

Motor Car Sales Co., El Paso, Tex., has changed its name to the Fleming Motor Car Co. The company handles Hupmobiles and Jordans. A. Fleming is president and general manager. There was no change in the personnel of the firm.

Amarillo Storage Battery Co., Amarillo, Tex., has moved to its new home. The company spent several thousand dollars in overhauling and rearranging the building. It is now operating a kind of accessory and parts department store and has one of the finest displays in the Panhandle.

Hurlburt-Still Electric Co., Houston, Tex., has outgrown its old quarters, established 20 years ago, and has moved downtown where it occupies a three-story brick building.

William Spear, Mason City, Ill., has leased the new building just completed by Roy Gardner, for a garage and motor vehicle sales agency. The structure has a frontage of 100 ft.

B & B Accessory Co. has been organized at Decatur, Ill., and will handle automotive supplies. The owners are Gordon Brown and Frank Battrell.

J. O. Huffman, Kewanee, Ill., has retired from the Tracy Motor Corp. and has purchased the interest of Harvey McMullen of Cambridge in the Kewanee-Buick Co. He will have as partner, A. G. Fell.

Charles A. Starr, Decatur, Ill., distributor of the Ford car and Fordson tractor in Macon county, has purchased a new site and will erect a modern garage and service station.

C. T. Dunkle Motors Co. will represent the Cole Aero-Eight in Columbus, O.

Osmond-Jordan Co., Milwaukee, is a new \$25,000 corporation organized by N. E. Osmond and associates to take over the distribution of the Jordan in Wisconsin and Upper Michigan. Osmond formerly was a stockholder and officer in local distributing concerns representing the old Jeffery, now the Nash, and the Paige and Winton.

McGeehan-Buick Co., Green Bay, Wis., has been organized by Grover T. McGeehan of DePere, Wis., to act as district dealer of the Buick in Brown, Kewaunee, Manitowoc, Shawano and Oconto counties in northeastern Wisconsin. Mr. McGeehan is president of the Broadway Garage, for several years Buick dealer in DePere.

Purcell-Wischan Co., Madison, Wis., district distributor of the Hudson and Essex, is breaking ground for one of the largest sales and service headquarters buildings in Wisconsin. It will be 117 by 132 ft., part two stories and basement, and will cost complete \$120,000.

Modern Auto Parts Grinding Co., Sheboygan, Wis., has been organized to do special machine and repair work for garages and service stations in eastern Wisconsin.

John G. Wollaeger Co., Milwaukee, state distributor of the Studebaker, has awarded contracts for the construction of a \$150,000 sales and service building, to be 90 by 120 ft., four stories and basement, fireproof, ready about Jan. 1.

Wisconsin White Co., Milwaukee, has been organized as a corporation to act as distributor of the White truck in Milwaukee and eastern Wisconsin, with headquarters in Milwaukee. T. D. Kemler, president and treasurer, is also head of the Kemler Motor Sales Co., Madison, Wis., distributor in western Wisconsin. M. D. McNaughton, for 14 years with the White factory, is general sales manager for the entire state territory, with headquarters in Milwaukee. James E. Walsh, also with the White for four years at Cleveland, has charge of eastern Wisconsin sales. W. A. McElroy, formerly of Cleveland, is superintendent of service.

Jacobsen Auto Co., Madison, Wis., until recently Nash dealer, has been appointed distributor of the Jordan in five counties, with headquarters in Madison, the state capital.

Radiant Ray Light Co., Antigo, Wis., has been incorporated with a capital stock of \$25,000 to become distributor of the Radiant Ray lighting system in the greater part of Wisconsin. The officers are: president, E. R. Murphy; vice-president and general manager, Arthur Kingsbury; secretary, A. L. Marmes, and treasurer, Lyle Otis.

Milwaukee Automotive Dealers' Assn. made a direct and cumulative contribution of \$2,000 to the fund of \$385,000 raised for the purposes of the Centralized Budget of Philanthropies of Milwaukee in 1922 in a 10-day campaign, which ended Oct. 27.

Fox-Klein Co. has just signed a distributor contract with the Cole Motor Car Co. of Indianapolis to represent the Aero-Eight in Cincinnati.

Blalock Auto Co., Charlotte, N. C., has been chartered to do a general automobile business. Capital stock is \$100,000. The incorporators are B. H. Blalock, E. P. Singley and O. O. Hawkins of this city.

Macmillan & Mashburn is the name of a new automobile firm, Wilmington, N. C., which will handle the Dodge car. The members of the firm are S. G. Macmillan and L. D. Mashburn.

C. G. McManus, Albemarle, N. C., has sold his interest in the Albemarle Motor Co. to W. J. Cotton and J. D. Smith. The new owners have taken over the business and will continue to operate it.

The Studebaker agency, Winston-Salem, N. C., formerly held by the J. W. Wix Co., has been acquired by A. H. Galloway and W. G. Tennie. The new company will also distribute the Locomobile. Currin will continue as manager of the business.

Carl R. Webb, Charlotte, N. C., will open a sales and service agency here for the Roamer cars. The firm will be known as the Roamer Sales Agency. The Roamer has not heretofore been represented in Charlotte.

Frederick H. Fitzpatrick, formerly with the Stoddard Motor Car Co., has taken the Springfield, Mass., agency for the Wills Sainte Claire Co., and is fitting up a salesroom. A service station will be run in connection.

Radio Co., Springfield, Mass., has bought a site and will at once erect an auto repairshop. George U. Radio is the principal owner.

Hirsch Cycle Co., Seattle, has purchased the stock and business of the Falls City Cycle Co. here, according to C. F. Bruschi, manager.

Canadian Dealers Radiate Optimism for 1922-23 Sales

Business at Present Is Spotty, but Price Reductions Aid Materially

TORONTO, Nov. 5—Automobile business in Canada continues spotty. Companies which have made radical price reductions report excellent business. This applies to Canadian makes as well as imported lines. The general feeling is that next year will be good and 1923 excellent. The outlook of the average dealer is decidedly optimistic.

The air is full of rumors about American companies establishing Canadian factories. The passenger car companies included in this list are Liberty, Hupmobile and Paige. The International Harvester Co. has taken over a plant in Chatham and now produces International trucks there.

W. C. Durant has spent considerable of his time for the last two or three weeks in this city. Arrangements have been completed to go ahead with the Toronto plant, and stock is being offered to the public. Durant Motors of Canada, Ltd., has not as yet decided whether to link up with A. L. Carron of Carron Brothers, Montreal, and take over their extensive munitions plant for export business. It is understood that Durant personally favors this plant because it would keep the Toronto plant busy supplying parts to the assembling plant for export during slack seasons. Inasmuch as the plan affects Durant operations in the United States, the final decision is understood to rest with the board of directors.

PORTLAND DEALERS MEET

Portland, Ore., Nov. 5—Officers of the Automobile Dealers' Assn. of Portland for the coming year were elected at the regular annual meeting of the association in October.

A. H. Brown, manager of the Portland branch of the Northwest Oakland Co., Oakland wholesale distributor, was elected president, being elevated from the position of vice-president. A. C. Stevens, Haynes and Winton dealer, was named vice-president. Ralph J. Staehli, non-dealer member and executive secretary and treasurer, was retained in that capacity.

NO CHANGE IN STANDARD

Pittsburgh, Pa., Nov. 7—"Nothing to it," said W. E. McCullough, when interviewed in the office of W. M. Morrow, general sales manager of the Standard Steel Car Co., here today regarding the rumor that the firm would abandon the making of passenger automobiles and concentrate its efforts on trucks.

McCullough said that his firm was not ready to announce its plans for 1922 cars, as they will not be ready before the early part of the year.

The Readers' Clearing House

Questions & Answers

CONDUCTED BY WILLIAM H. HUNT

INSTALLING NEW DODGE TIMING GEARS

Q—What is the quickest and easiest way to install a set of new timing gears in a 1919 model Dodge car?

2—Will a puller be necessary to remove the old gears?—M. L. Baber, Blue Grass Garage, Winchester, Ky.

1—Drop the driveshaft, remove all connections between the engine and frame, and shift the former back until the front end can be raised clear of the frame cross-member. The procedure from this point is obvious.

2—A puller will be needed to remove the crank and camshaft gears.

EVAPORATION OF STORAGE BATTERY ELECTROLITE

Q—Does the Electrolite evaporate from the storage battery? We know that the acid does not evaporate and we know that the water does. Of course, it takes the acid and water to make electrolite. Now the question is, does the electrolite evaporate or does the water evaporate? What is the correct answer?—G. W. Thompson, 2936 Carry st., Kansas City, Mo.

You are quite correct. The acid does not evaporate. The water evaporates from the acid, leaving the latter and, of course, as the evaporation proceeds, the electrolite becomes of higher specific gravity—greater strength. However, there is a small loss of electrolite going on constantly. This is caused by the almost insensible spray that is thrown out through the vents. For this reason it is necessary to renew the electrolite at long intervals. This job—adjusting the acid, as it is called—had best be done by a battery service station. The second part of your query is being answered by mail direct.

MAXWELL HIGH GEAR SLIPS OUT OF MESH

Q—We have a 1916 Maxwell that keeps slipping out of high gear on the road. We have examined the gears and also made sure that there is no end play existing, and the high gear shifting fork shows but little wear. Enlightenment on this will be appreciated.—W. G. Robertson, Fanders & Robertson, Diller, Nebr.

This condition is usually caused by one of two things. Either the high speed shifted fork has become sprung so that the gears do not mesh to their full distance, or the locking device is worn so that it no longer holds. Inspect the gears again and be sure that the high speed meshes to its full depth. If it fails to do so, shift the gears back to neutral and, keeping a pressure on the high speed shifter to keep it from moving ahead, insert a crowbar and spring the fork about $\frac{1}{2}$ in. toward the front. If this does not remedy matters, examine the shifter shaft and note whether the notch in

The Readers' Clearing House

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department, readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by someone else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

Emergency inquiries will be replied to by letter or telegram.

Addresses of business firms will not be published in this department, but will be supplied by letter.

which the locking pin seats, is worn. If much wear is apparent, deepen the notch with a three corner file and fit a new pin and heavier spring. These things should remedy the aggravating trouble completely.

WIRING OF 1914 SAXON CAR

We are working on a small four-cylinder Saxon car upon which we cannot see the model mark except the numbers 14-21673 on the engine. It has a Detroit Starter Co.'s starter and generator combined, Atwater-Kent ignition and a Ward-Leonard automatic dynamo controller, type CD316, No. 105512. The starter generator is located on the right rear side of the engine and is driven by a chain from a gear just ahead of the flywheel on the crankshaft. We are at a loss as to just how this machine should be wired and are writing to request that you supply or publish a wiring diagram.

2—Indicate into which circuits an ammeter could be connected.—McCue Garage, Goodells, Mich.

1—As nearly as we can determine this

is a 1914 car. The wiring diagram is shown in Fig. 1.

2—The small wire leading from the starting switch is cut at the point marked X and the ammeter inserted in the circuit.

WHEEL AND STEERING GEAR ADJUSTMENT

Q—In your October 13 number, on page 33, referring to item on wheel misalignment: we had a job come into the shop with this same complaint and, on applying the straight edge, we find that one side lines up all right but the left rear wheel will not touch the straight edge, applied across the front wheel, by a full inch or more. What would you suggest doing in this case?

2—What other adjustments, aside from turning down the nut at the top of the worm, can be made on the Gemmer steering gear?

3—Are the rear axles on the 1917 Bour-Davis splined or square?

4—Do you publish a book of any kind covering information in back numbers of Motor Age?—L. P. Lory, 497 Forest st., Oakland, Calif.

1—We should say that this adjustment was about right. If you mean that the straight edge was applied across the outside of the front wheel, the fact that it would not touch the rear wheel shows that the front wheel was toed in, as it should be. The only thing we can suggest is that the toe-in be increased.

2—Full instructions for the adjustment of Gemmer steering gear was published in the April 15, 1920, issue. Following is an extract of the method of setting the worm wheel. If setting the worm does not eliminate all the lost motion, wear can be compensated for immediately by turning the worm a quarter way around, thus presenting a new set of teeth to engage with those on the worm gear.

This adjustment can be made as follows: loosen the clamping bolts and remove the steering arm. Turn the steer-

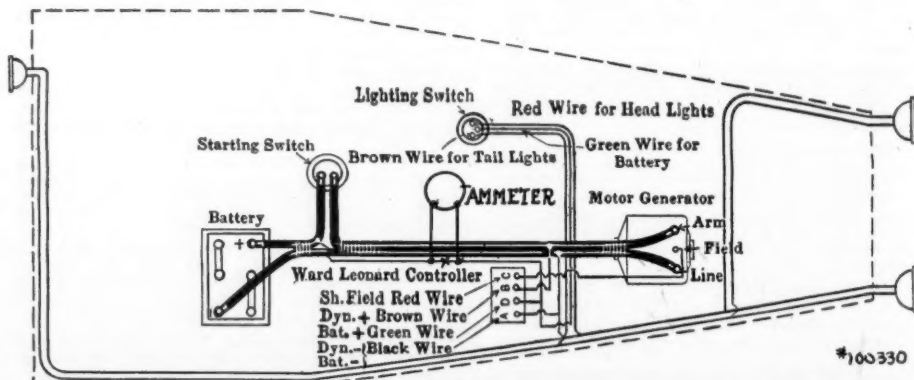


Fig. 1—External wiring diagram of 1914 Saxon car. Apparatus: Detroit-motor-generator, Ward-Leonard controller, Type C.D. Atwater-Kent distributor

ing wheel a quarter turn around and replace the arm.

3—Square.

4—MOTOR AGE does not publish a complete index. However, every article which has ever appeared in the magazine is listed in a card index and can be located instantly at any time.

EXPANDING PISTON RINGS BY HEAT TREATMENT

Q—Can you give us any data concerning the expansion of cast iron pistons by heat treatment? How much can pistons of various sizes be expanded?

2—What is the theory of this expansion?—L. P. Bicknell, Calif.

1—We have no data other than that we have already published, which is referred to in your letter. This will depend upon the grade of iron. An expansion of .004 to .005 in. seems to be about the limit.

2—That of gas and carbon absorption as well as molecular change. The latter theory is not well substantiated but strongly suggested by the fact that expansion is attended by weakening. The process which you are using seems to be giving excellent results and we suggest that you adhere to it.

PERSISTENT KNOCK IN OVERLAND 85 ENGINE

Q—We have been working on an Overland, model 85, which has a small knock like a loose wrist pin or a worn tappet; it is not either of these, however, because they were all looked over and adjusted. Still the knock persists.—Andrew Weisman, Rockville, Minn.

The knocking may be occasioned by any one of several things. However, we suspect that it is either a worn ring or a slightly sprung connecting rod. The latter taps against the piston boss quite sharply at certain speeds and sounds very much like the knock caused by a worn wrist pin. The remedy is to square the rod up on an aligning jig, or with a surface gage.

INTENSIFYING FORD HEADLIGHTS

Q—The lights on a certain 1917 Ford car are not as good as desired. What is the best and cheapest way to put on good lights?

2—Are intensifiers any good and will it take the strength away from the magnetos or coils?

3—Which would be cheaper in the long run, a 6-volt battery or dry cell for a spotlight?

4—We have a starting motor from a Chevrolet 490. Can we rebuild it into a generator and put it on a Ford? If so, how can it be rebuilt?

5—How can a simple intensifier be made?

6—If a 6-volt storage battery is used, what amperage bulb would you advise for a spotlight?—A. J. Johannis, 935 Jarrett St., Portland, Ore.

1—We suspect that the trouble is not so much in the lights as in the magneto. This should be tested for voltage and for end play in the crankshaft. The voltage should range between 18 and 25 and there should not be over 1/32 in. clearance between the flywheel magnets and the magneto coil winding.

2—Intensifiers serve a very good purpose on engines which are inclined to foul plugs. That they are of any real value on clean running engines is ques-

tionable. They put an overload on the ignition coils and a slight one on the magneto. If there are any weaknesses in the insulation of the coils, there is a chance of a breakdown. They are not likely to damage the magneto.

3—Storage battery.

4—We should not recommend attempting to rebuild the starting motor into a generator. Although it can be done, the benefit will not warrant the expense. We recommend that you communicate with some of the dealers in used equipment whose advertisements appear in our advertising pages, asking them to exchange an Auto-lite generator of the type used on the model 83 Overland for the starting motor.

5—Drill two 1/8 in. holes 1/2 in. apart in the end of pieces of sheet fibre about 1 in. long by 1/2 in. wide by 1/8 in. thick. Fit one hole with a binding post from which a section of stiff wire extends past the center of the other hole. Install the device on the spark plug, attaching by means of the unoccupied hole, and bend the section of wire until it is 3/32 to 1/4 in. away from the spark plug terminal. Attach the plug wire to the intensifier binding post and you will have a device which will make most any fouled or even cracked plug fire.

6—Pay no attention to amperage. A 6-volt, 21-cp. bulb will serve your purpose perfectly.

INSTALLING STARTER ON 1913 MICHIGAN

Q—Publish the answers to the following questions regarding a Michigan car Model L, No. 7608, manufactured in Kalamazoo. What year was this car manufactured?

2—Can a starter be installed and, if so, what kind?

3—Publish a wiring diagram.

4—Can a high tension magneto be put on?

5—Where can parts be procured?

6—It has 34 by 4, straight side, quick detachable, demountable rims. Where can rims like these be procured?—C. A. Haworth, 1106 Lowe St., Green Bay, Wis.

1—1913. Starter equipment was optional on these cars.

2—There is no insurmountable obstacle which would prevent the installation of a starter, but we question the advisability of doing so, as the cost would be greater

than the value of the car. As mentioned before, the North East starter was optional on these cars and, while it is possible that the machine you have was originally equipped with a starter, which has been removed, it is also possible that it was sold without one. The simplest and most economical plan would be to purchase a generator and a starting motor, equipped with the Bendix drive, from some one of the concerns specializing in used equipment. The engine flywheel would have to be removed and fitted with a ring gear and the generator would have to be driven by either chain from the pump shaft or from the fan belt. The former is to be preferred but the latter would cost less to install. As intimated before, we recommend that the installation be not attempted.

3—If the car was originally equipped with a starter, the diagram shown in Fig. 3 will apply.

4—A high tension magneto can be installed and driven from the pump shaft by chain. As there is no information available regarding the speed of the pump shaft in relation to the speed of the camshaft, we cannot advise you what size sprockets or gears will be needed. However, this is a simple matter to figure out, as the magneto must run at crankshaft speed.

5 & 6—This information is being supplied by mail direct.

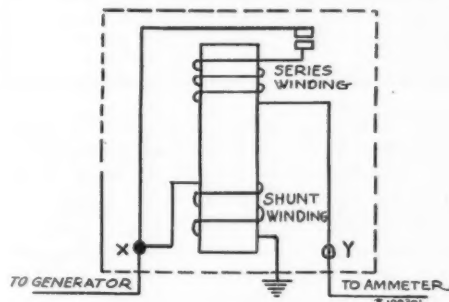


Fig. 2—Diagram of the windings and connections of the Auto-Lite cutout used on the Chevrolet cars. Note that this device is a simple cutout and not a regulator

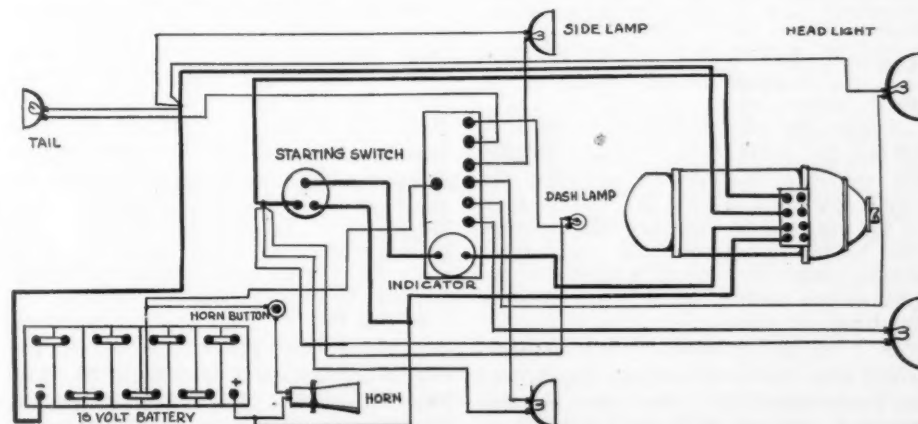


Fig. 3—External circuits of 1913 Michigan car. Apparatus North East motor-generator, starting switch and instrument panel

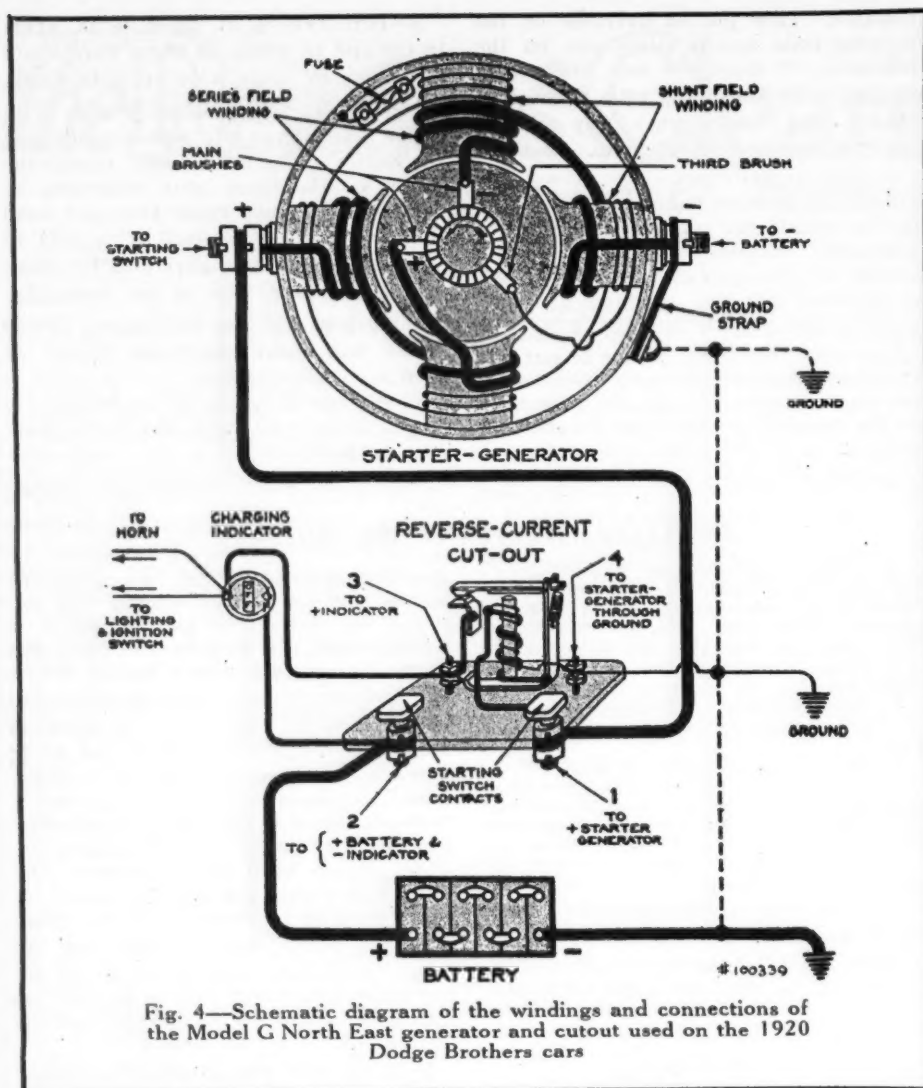


Fig. 4—Schematic diagram of the windings and connections of the Model G North East generator and cutout used on the 1920 Dodge Brothers cars

ELECTRIC SYSTEMS ON THE DODGE AND CHEVROLET

Q—Publish internal wiring diagram of the 1920 model North East generator and starting system used on the 1920 Dodge car and give reason for the fuse. We have noticed that there is only one cable running from the motor-generator to the starting switch.

2—A starter on a 1920, 490 Chevrolet car smokes when the engine is started. The battery is fully charged.

3—Give instructions for lining up the crankshaft when installing a new center main bearing in a 1920 Chevrolet.

4—Publish a diagram of the cutout and regulator used on this car and instruct how to adjust the charging rate.

5—What stroke has the Essex engine—long or short?

6—The Hudson?—Frank Sinka, R. R. No. 3, Algona, Wis.

1—See Fig. 4. The fuse is used to protect the shunt field windings. Should the generator become disconnected for any reason, the current will rise so high in the shunt field windings that the fuse will be blown. This being a grounded system, only one wire is needed, the return to the battery being made through the frame of the car.

2—A partial ground, or oily brushes, would give rise to this effect. We strongly recommend that the unit be dismounted, cleaned and overhauled thoroughly and equipped with new brushes and springs.

3—The best method of aligning main bearings is with a special aligning reamer. However, the job can be done without the tool by the following method:

With the engine on the bench and the new bearing in place, apply a light coating of prussian blue or lamp black to the center bearing of the shaft. Place it in position in the bearing and rock back and forth several times, turning it completely over. This will mark the bearing heavily. The marks are then scraped out by hand and the operation repeated. A point will finally be reached where the shaft bears in all three bearings. This is checked by applying prussian blue or lamp black to all of the shaft bearings, and proceeding as above. When the marks are equal in all three bearings, the job may be considered as finished. The caps are then fitted in the same way, and finally the whole assembly is tested by marking the shaft and pulling the caps down upon it. It is quite likely that some additional scraping will be needed after this is done.

4—See Fig. 2. This is what is known as a third brush system and the regulation is accomplished by shifting the movable brush from point to point on the commutator. It will be necessary to use an accurate ammeter when doing this job, and after the charging rate has been

adjusted to from 10 to 12 amp. at high engine speed, the brush should be fitted by sanding in.

5—With a bore of $3\frac{3}{8}$ in. and a stroke of 5 in., the Essex engine is classified as a long stroke type.

6—The Hudson bore is $3\frac{3}{8}$ in. and the stroke 5 in. It is also a long stroke type.

LIGHT WEIGHT PISTON IN HOLT TRACTOR

Q—We are contemplating rebuilding a 75-hp. Holt tractor and the owner wishes to have the cylinders rebored and oversize pistons put in. He has read and heard quite a lot about the Deluxe piston and, as it is claimed to be 30 pounds lighter than a Holt piston, he wishes advice about putting them in the heavy duty engine. Do you think they would hold up? Would there be any advantage over the iron piston?—A. E. Cheek, 612 Main St., Peoria, Ill.

You or your customer are badly mistaken regarding the weight of the piston. Although we do not have the exact weight available, judging from the bore and stroke— $5\frac{1}{2}$ by 7 in.—of the Holt 10-ton tractor, we are positive that the pistons cannot weigh 30 pounds each. This being true, of course the piston mentioned could not be 30 pounds lighter. Featherweight pistons are used in passenger cars to better engine speed and acceleration. These are not particularly desirable features in a tractor engine, and we therefore believe that you will do well to advise your customer to adhere to the iron pistons.

ANOTHER 490 CHEVROLET RACING CAR

Q—We intend to rebuild a 490 Chevrolet for dirt track racing and wish information on the following points:

1—Would you advise having about $\frac{3}{16}$ in. planed off the head of the pistons to raise the compression?

2—Are aluminum or cast iron pistons the most efficient for track work?

3—Give names of piston manufacturers.

4—Have you any record of Dowmetal pistons ever being used on the track?

5—Are Ford 3 to 1 gears interchangeable with 490 Chevrolet gears and pinions?

6—Are Ford wire wheels interchangeable with Chevrolet wheels?

7—Where can we purchase a high speed camshaft for this car?

8—In a recent issue you advised a party to lighten the flywheel to increase the revolutions per minute. If counterbalances were fitted to the crankshaft, wouldn't it be just putting back the weight that was removed from the flywheel and wouldn't it have a tendency to slow up the engine and lower the car speed?

9—What per cent of the total weight of the car should be on the back wheels?

10—Is there any advantage in shortening the wheelbase for one-half mile dirt track racing?—R. P. Mock, 319 W. B Street, Casper, Wyo.

1—Yes, if there is sufficient stock. One-eighth in. had best be tried first.

2—Both have given very good results. We cannot recommend one over the other.

3—The names and addresses of the manufacturers will be found in our advertising section.

4—We have no record of Dowmetal having been used in racing cars. If the metal will withstand the enormous strains, it should make ideal material for pistons, as it is claimed that it is only about one-half the weight of aluminum

and that it has but very little expansion under pressure.

5—Yes.

6—No.

7—We know of no concern making high speed camshafts for this engine. However, we have been informed that one of the builders of racing cars supplies them to special order for about \$150. His name and address are being supplied by mail direct.

8—Flywheels are lightened not so much to realize greater r.p.m., as snapper acceleration. The fitting of counterbalances will not quite offset the amount of weight removed from the wheel, as they are much nearer the crankshaft center. Lightening flywheels and fitting counterbalances are "rule of thumb" matters and are worked out on the "cut and try" principle.

9—The weight should be equalized. This subject was treated quite clearly in the March 24 issue under the heading, "Race Car Weights." We can do no better than reprint the article here. The ideal arrangement in a race car is to secure an exact balance on all four wheels. This is appreciated when the effect of centrifugal force is considered. If a car is heavy on the front end, the tendency will be when rounding a turn for the front end to fly out before the rear end does.

If we imagine a racing car as composed of a large elastic mass rounding a left-hand turn, the car would pile up on the front right wheel. Of course, such a picturization is a comical illustration, but this is exactly what happens to race cars on the Indianapolis track. Invariably the front right tire shows more wear than any other tire on the car. Now, if the weight is distributed more on the front than on the rear, which would be the case with a short wheelbase car, and the engine set well up forward toward the front, as it would be in a rebuilt Chevrolet racer having its rear end stripped and lightened, the effect would be for the car to work continually toward the outer side of the track.

A contribution on the same subject from Mr. L. Y. Sullivan, Liberal, Kan., published Sept. 20, 1917, corroborates the foregoing in the following terms:

"First, decide how long you want the wheelbase; 105 in. is very satisfactory for dirt tracks. Second, swing the engine in the chassis so that all of the weight possible will be resting on the back part of the front springs. This tends to keep the front wheels from jumping up and down, which is very hard on tires, especially on the curves. Third, decide just how far back you wish the seat to be—as near over the center of the back springs as possible. Then place the seat and begin balancing as follows: put all four wheels on scales at the same time then begin distributing the weight by putting on the water tank, oil tank and reserve gas tank. Then figure how much the driver and mechanic will weigh and make the back end light accordingly.

10—The present wheelbase of 102 in.

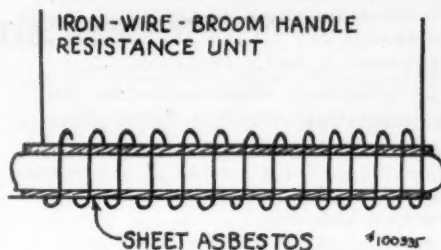


Fig. 5—A simple resistance unit made by winding iron wire on a section of pipe or a broom handle

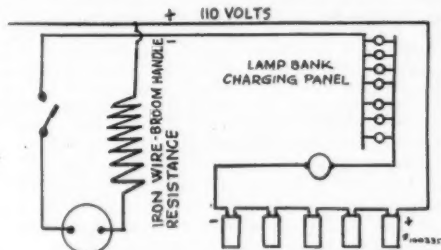


Fig. 6—Left: The broom handle resistance connected in series with a hot plate. Right: A lamp bank resistance used for charging batteries

will probably be satisfactory, although better results are being had with wheelbases of from 96 to 98 in.

PERSISTENT KNOCK CAUSED BY SPRUNG CRANKSHAFT

Q—A customer of ours has a model 45 Buick which has a bad knock apparently in the first or second connecting rod. It is just a solid bump at any speed, although not so loud when the engine is running idle. One night last spring the car was driven through heavy mud with the engine only hitting on five cylinders, after which ordeal the knock appeared. The second piston was taken out then and the wrist pin found very loose. A new one was put in, but it didn't make any difference. One mechanic suggested that it was a fuel knock. We tried pure high test gasoline but that didn't help any; so what is it, we don't know.

2—When this car is driven with a wide open throttle, it does not seem to get enough gas and will not do over 50 m.p.h. It didn't do that when it was new and it would make better speed. Could it be a clogged gasoline line? The carbureter vacuum tank or gas line has never been cleaned.

3—How fast ought it to go?

4—Would Deluxe pistons and lighter rods increase the speed? If so, how much?

5—Where can we get the lighter rods, and what changes would be necessary to get the speed up to 75 m.p.h.?

6—Is the Templar engine a valve-in-head type?

7—Is the Ranger engine a valve-in-head type?

8—Also what type is the Herschell-Spillman engine used in the Pilot car?—Herbert K. Childs, Corunna, Ind., R. R. 1.

1—We strongly suspect that the crankshaft was sprung during the heavy pull. The only way this can be proven is to remove it and center it in a lathe.

2 and 3—According to the power curve, wheel size and gear ratio of this car, a fair speed would be 55 m.p.h.

4—The lighter parts would help acceleration more than maximum speed, although they would also improve the latter somewhat.

5—The first part of this question is

being replied to by mail. That you can ever hope to attain a speed of 75 m.p.h. with this car is doubtful. Boring out the valve seats and the intake ports, installing the lightweight pistons and connecting rods and a racing type carbureter would increase the speed materially, but not to the maximum you desire.

6 and 7—Both overhead valves.

8—The Herschell-Spillman engine used in the Pilot car is an overhead type.

Your last question will be replied to by mail at a later date.

SHOP-MADE BATTERY CHARGING APPLIANCE

Q—In our business we use five storage batteries, six volts each, and it keeps us busy having them recharged. We have direct current—110 volts—and would be obliged if you would send us a diagram or sketch of how to wire up a lamp bank resistance to do our own charging; or advise the best manner of charging and the kind of instruments to use.

2—Where can they be obtained?

3—We have an electric hot plate that would be very good for vulcanizing tubes if we could regulate current so that it would not get too hot. Please send a sketch or drawing of some kind of a device that will regulate current. We can build it ourselves, if we have the directions to go by.—R. Thompson, 417 Virginia Ave., Indianapolis, Ind.

1—The rigging of lamp bank resistance panels has been published in this magazine repeatedly. Fig. 6 shows how to connect one as well as the connections for the resistance for the hot plates. Mount seven sockets on the panel board and use four 100-watt lamps and three 55-watt lamps. This arrangement will give you any combination desired from zero to about six amperes. An ammeter should be used in the charging line and we recommend that the charging current be held to five amperes.

2—A simple rheostat worth about \$35 can be procured from any one of several concerns, the names of which we are supplying by mail direct.

3—Wind a quantity of iron hay bale wire on a broom handle or iron pipe, as shown in the sketch in Fig. 5. First wind the handle or pipe with about six layers of asbestos paper to afford protection and prevent short circuits. Just how much wire will be needed it is impossible to say, but after winding, turns can be cut out until enough current passes to heat the hot plate to the temperature desired.

CHECK UP ON CARBURETER HEATING DEVICES

This is the time of year to check up carefully on carbureter heating devices. The couplings between the "stove" and the conduit and between the latter and the carbureter should be examined to see that there are no air leaks. The jackets of waterjacketed carbureters should be inspected to see that they are not heavily incrustated with rust or scale. It should also be made certain that there are no obstructions in the pipes running from the carbureter waterjacket. These should be uncoupled at both ends and the volume of water which will pass through them observed.

IGNITION CURRENT PASSES ACROSS SAFETY GAP

Q—What is the correct distance between the points of the safety spark gap of a Delco coil on a 6-40 Hudson car? This is the gap on the secondary circuit which prevents injury to the coil winding.

2—The breaker points and spark plugs are in good order and correctly spaced by Delco gage. In starting, the first four or five shots of current go across the spark gap instead of the plugs. After the engine is running, the firing across the gap is once in every 20 or 25 explosions; irregular. New rotor, breaker cam, distributor cap and spark plug wires do not help matters. Could a warped coil shell bring the points too close?—August H. Wild, Box 401, Springfield, Minn.

1 & 2—The correct gap is about $\frac{3}{8}$ in. As you say the gap is placed in the circuit to protect the coil windings, in case one of the spark plug wires should drop off. For this reason no great accuracy in setting the gaps is required, as all that is necessary is that the resistance across it shall be less than the resistance of the coil insulation. While it is possible that the coil shell may have warped enough to bring the points a trifle closer together, we doubt it. We believe the trouble to be due to one of two things: either a too wide spark plug setting or dampness. Another possible cause is excessive compression; but unless the engine has been remodeled, this can be eliminated from the consideration. You can probably cure the trouble by setting the spark plug points a trifle closer together.

MAXIMUM SPEED OF DODGE ROADSTER

Q—Can we obtain 60 m.p.h. out of a Standard Dodge roadster without windshields?

2—Is the Dodge engine capable of turning over 26,000 r.p.m.—Ray J. Kissinger, Glenvil, Neb.

1 & 2—It would not be necessary for the Dodge engine to turn over 2600 r.p.m. to do 60 m.p.h. As these cars are geared at 3.62 to 1, an engine speed of 2400 r.p.m. would give better than 60 h.p.h. The official power curve shows that the engine developed its maximum power at 2200, but it is entirely within the possibilities that an engine which has become well limbered and been tuned up for the occasion, could develop 2400 r.p.m. or, as said before, a trifle better than 60 m.p.h. We would advise that you make no bets.

REASON FOR SEASONAL AIR ADJUSTMENT

Q—Why is it that some cars have an adjustable opening in the air intake pipe to regulate the amount of heat coming from the exhaust pipe? We have always had the impression that the greater the heat on the gas, the greater the vaporization and consequently the stronger the explosion.

2—Does introducing water vapor into the mixture increase gas consumption or reduce it?—C. H. Wheatley, Hillyard, Wash.

1—The device you mention is what is known as the seasonal air adjustment. It is provided so that hot air can be introduced to the carburetor during cold weather. This is not desirable during the hot months, for the reason that while it is true the more heat applied the better the vaporization, it is also unfortunately true that too much heat expands

the incoming gases to the point where not enough can get into the cylinder and the power is badly curtailed.

2—Laboratory experiments have failed to demonstrate that the introduction of water vapor betters power or economy. Water vapor is of service in a kerosene burning engine, for the reason that it prevents knocking.

HEADLIGHTS BURN DIM AND TAIL LIGHT BURNS OUT

Q—Can you inform us where we are likely to find the trouble in a 1921 Winton, Model 25, Bijur lighting system? The tail light globes continually burn out every two or three days and new ones must be installed. Also the front headlight bulbs are very weak and there is a drop in the line between the battery and the headlight sockets. We found this once in the small copper strap which connects the ground to the battery cable, but the trouble is not there now. This small strap connects between the battery cable and the starting motor.—Ivor M. Most, 2112 Beard Ave., S., Minneapolis, Minn.

It is barely possible that you have been purchasing rear lights and globes of too low a voltage rating. Although rated at two candlepower, these globes should be 6-8 volts. If the connection between the battery side of the ammeter and the starting switch is fouled in any way, the effect will be to divert most of the generator voltage through the lights. This, of course, would result in burning them out.

Disconnect the small wire from the starting switch and also from the ammeter, and clean the terminals and connections thoroughly. It is not at all surprising that there should be a slight voltage drop between the battery and the headlights. This is accounted for by the length of the wire.

Another cause for the drop can be looked for in the lighting switch contact which may have become fouled. All the lighting terminals should be disconnected and cleaned. As the headlights are grounded, it is not unreasonable to suspect that the contacts between the brackets and the frame may have become faulty, due to rust formation or oil working in. This may be checked by connecting a wire directly from the bulb socket inside of the lamp to a perfectly clean place on the frame. If the fault is in the lamp ground, this will detect it, as the light will immediately burn up to full brilliancy.

If it fails to do so the trouble is in the lighting switch or in the lamp leads. If in the latter it could hardly be more than a high resistance ground, and it is not at all likely that it would form in both of them at the same time. This almost eliminates this possibility and leaves it up to the switch or the headlamp ground connections.

STOPPING TIRE VALVE LEAKS

A leaky tire valve plunger can be made to hold by applying a drop of oil. The oil partially dissolves the rubber gasket and causes it to seat itself to an airtight joint. Although the valve is spoiled upon removal, the oil will have enabled it to serve its purpose.

FREAK FIRING ORDER 1-2-3-4 NOT USED

Q—A question came up today which we were unable to answer, and we would appreciate it very much if you would assist us in the solution of it. The owner of a Chalmers car is said to have the engine timed so that it fires 1-2-3-4. Is this possible in a gasoline combustion engine? If so, what cars, if any, are designed in this manner?—C. H. Jingst, Tri-State Auto Top Co., 807 Main st., Keokuk, Ia.

Back in the early days of the industry when it was not positively known whether two-cylinder or multi-cylinder engines were the coming thing, a few four-cylinder engines with a firing order of 1-2-3-4 were built for laboratory experimental purposes. While it is true that they ran, they were so badly balanced that it was necessary to mount them on concrete bases in order to keep them from shaking themselves to pieces. There are no engines using this firing order today and, if the person in question has changed his engine over to fire in this order, which we very much doubt, it has been necessary for him to install an entirely different crankshaft and camshaft from those used in conventional practice.

FULL BALL BEARING ENGINE

Q—Advise us if any automobile manufacturer has ever tried ball bearings on the crankshaft bearings and also if anyone has endeavored to use ball bearings for connecting rods.—J. C. & J., Ponca City, Okla.

The use of ball bearings for the crankshaft was discontinued by most manufacturers several years ago. Among the popular cars of that time so equipped were the Lozier, Chalmers, Mercedes, and White. Attempts have been made to use ball bearings in connecting rods but with indifferent success. At one time, Mr. W. B. Moore produced a few cars which were called all ball bearings cars. It is our understanding that the engines, transmissions, axles, wheels and steering gears of these cars were full ball bearing. At the present time the Fiat Co. is building a full roller bearing engine; by this, it is meant that the crankshaft bearing, as well as the connecting rod bearings, are of the roller type.

ROLLER BEARINGS FOR FORD STEERING SPINDLES

Q—Please inform us whether or not we can obtain a set of roller bearings to replace the brass bushings on the Ford steering spindle?—Buda Auto Co., F. W. Van Sickle, Buda, Ill.

We know of no such devices being manufactured. It should not be necessary to equip these points with roller bearings if the bushings are kept correctly lubricated. The excessive wear is invariably the result of inexcusable neglect.

DETECTING A POORLY-FITTED PISTON RING

A badly-fitting piston ring which causes a characteristic click can be located by injecting some heavy steam cylinder oil or glycerine into the combustion chamber of the suspected cylinder. The heavy lubricant, acting as a cushion will temporarily eliminate the annoying sound.

MYSTERY TALES

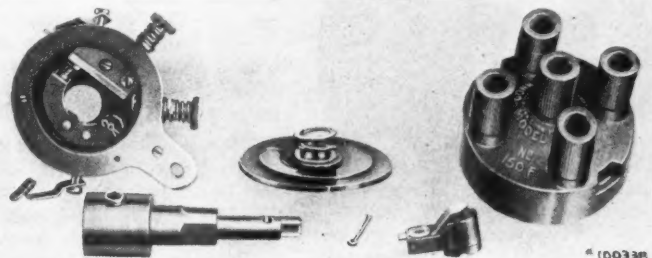
MYSTERY TALE, NO. 103

Why Did the Bearing Burn Out?

Some time ago we had a Cadillac 8 in the shop to put a new bulb in the tail-light. This car had run 2,400 miles and was in first-class condition. After the tail-light was fixed, the car was started, with the intention of putting it in the stall until it was called for. After it had been backed down the floor about 40 ft., a connecting rod bearing burned out completely. Upon examining the oil level, it was found to be about three-quarters full and the gage was working. The engine was started for just a minute to check the oil pressure and it was found that the gage was registering correctly. Upon removing this burned out rod we found that the oil line and the hollow ducts in the crankshaft were all free and open, as they were tested with compressed air to be sure. We installed a new bearing and put up the base, leaving everything as it had been found and the engine has now run over 9,000 miles with no trouble whatever. What caused that bearing to burn out?—Jack Beater, Lee County Motor Repair Co., Fort Myers, Fla.

This is one of those aggravating mysteries. Our surmise is that a momentary stoppage in the oil line cut off the lubrication from the bearings. As the engine was started to test the pressure, as shown by the gage, the obstruction was washed out. This is only a surmise, and some one of the Mystery Tales students may be able to supply a better theory.

Fig. 7 — Component parts of the Connecticut distributor used on the 1920 Dort car. Wear between the shaft and the breaker box permits wobbling, which results in missing, or complete failure of ignition



MYSTERY TALE NO. 104

The Queer Circumstance of the Retarded Spark

We have been asked to remedy a peculiar trouble in a 1920 model Dort. While running along at any speed it will stop, but as soon as the spark is retarded, it will start up again, or if the spark is already retarded and then advanced, it will continue to run. We have put on a new ignition breaker box distributor head, which helps some but does not stop the trouble altogether. Could the trouble be in the coil? It seems to spark well under test.—J. C. Mularky & Co., De Pere, Wis.

This is one of those cases where everything is alright and still wrong. We suspect that the trouble will be found in the distributor shaft. Lost motion, caused by wear, between the shaft and the breaker box allows the latter to

wobble. Fig. 7 illustrating the breaker and distributor disassembled, will make the point clearer. Should the wobble become great, the cam may even push the breaker box to one side to such an extent that the points fail to open at all. Moving the breaker box by means of the spark control linkage has the effect of again centering it on the shaft, when it becomes operative. We believe a careful check of this point will disclose the foregoing as correct, but we solicit the opinions of Mystery Tales readers.

MYSTERY TALE

The Straightening Job That Failed

Having been greatly interested in the Mystery Tales, we wish to submit one that has puzzled us greatly. A Dodge car which had been run into a concrete culvert at high speed and badly wrecked, bending the front axle, the frame, and all the steering gear and linkages, as well as breaking the transmission housing and springs and part of the steering gear proper, was rebuilt. All broken and bent parts with the exception of the axle and frame were replaced with new. The frame and axle were carefully straightened and, in reassembling the chassis, everything fitted correctly. But since the car has been run, it has gotten so it steers badly. On smooth roads it steers alright, but on any kind of soft roads it cannot be kept in the road, darting all around.

All bushings and bolts in the steering gear have been replaced with new ones;

also the gears and bushings in the gear box and the bearings in the wheels. The front wheels have been checked over and found to line up in every way, having the proper camber and a slight "toe in" at the front. They have been lined up with the rear wheels and found to be correct. The front axle has a slight slant to the front from the bottom side, which it should have. It acts like a Ford with the front axle too straight up and down or with a bent "wishbone." Can you suggest a remedy?—S. Wheatley & Sons, Jasper Garage, Jasper, Tex.

The more perfect the mechanism is and the fewer chances there are of it going wrong, the more difficult is it to find the trouble when something does go wrong. This seems to be your dilemma. The car is apparently perfect in every respect and cannot possibly go wrong, —yet it does so. There are three things

which occur to us. Possibly the frame was not so well straightened as you thought, and now has a tendency to make the car sway. You have not mentioned whether or not you verified the angle of the steering knuckle arms with the rear axle. This point is almost invariably overlooked and is one of the most important.

With the front wheels lined up with the rear wheels and having the proper "toe in," a line through the steering spindle and hole in the steering arm should pass through the center of the rear axle. Lines so drawn from each steering arm should intersect at the rear axle center. We recommend that you check this point carefully.

Have you examined the amount of side motion in the rear of the front springs? It is not unusual for wear to occur at the shackles, which permits the rear ends of the front springs to swing back and forth to a considerable degree. Taking an exaggerated case, let it be pictured that the amount of play at this point is six inches. It is very plain to see that if the rear ends of the springs should suddenly shift six inches to the left, the whole front axle would be turned a considerable distance to the right and the car would shoot off in that direction. The same effect, of course would be had if the springs suddenly shifted to the right. We believe that a check up of the three foregoing points will disclose the trouble; however, suggestions from other Mystery Tales readers will be appreciated.

MYSTERY TALE

Valves Seem to Have Odd Compound Motion.

Regarding the question from Mr. A. Jullien, Calgary, Canada, which appeared under the above head in the September 29 issue: having had similar trouble on another make of four-cylinder car, I found that the cams on the camshaft were either not ground true at the factory or were worn by the pounding of the push rods. At any rate, the radial portions of the cams are not truly retained in the same angular distance, making one side of the cam higher than the other and giving a false opening; thus it is necessary to have too much clearance between the valve stem and the push rod.—C. W. Jackson, 745 Geary St., San Francisco.

(Another reader has suggested the foregoing explanation and we have expressed doubt regarding the correctness of it. However, the phenomenon seems to have been observed by several, and the reiteration of the opinion gives it weight.—Ed.)

TREATMENT OF DRY PLATE CLUTCHES

The word "dry," applied to clutches, should be interpreted in a comparative sense. There are very few dry plate clutches but will operate more smoothly if the plates are washed with kerosene occasionally and treated with a very light coating of light oil.

The Accessory Show Case

New Fitments for the Car

DUMORE UPHOLSTERY CLEANER

This is a vacuum cleaner, designed and built primarily for cleaning the upholstery of closed cars.

The cleaner is portable. When in use it is placed on the ground outside the car. A 10 ft. length of flexible hose is furnished, on the end of which is attached a swivel hand-grip or nozzle. The brushes, of China bristle and leather bound, will not injure the fabrics. The motor is a Universal type, and operates on either direct or alternating current. The base is hardwood with an ebony finish, on which is located a kick type switch.

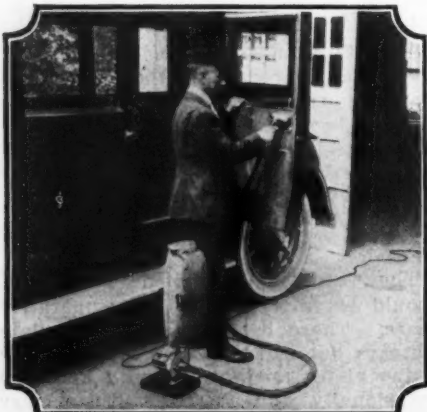
The cleaner comes complete with 25 ft. portable cord and attachment plug. Wisconsin Electric Co., Racine, Wis.

SPOTLIGHT FOR ATTACHMENT INSIDE ENCLOSED BODIES

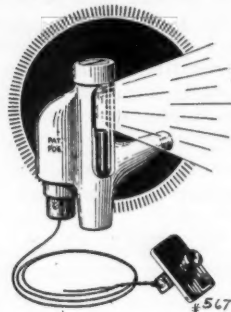
The Perfecto Raydeflector is an attachment which permits the spotlight to shine through the windshield of enclosed bodies. It attaches to the instrument board and a handle allows the driver to direct the rays wherever they are needed. A flexible hood pressed against the windshield glass eliminates the glare which would result from the light shining through the windshield, and still permits movement of the spotlight. It can be detached from the bracket and used as a trouble light. Reiber-Kolz Mfg. Co., Adrian, Mich.

SUSPENSION RADIATOR CORE FOR FORD TRUCKS

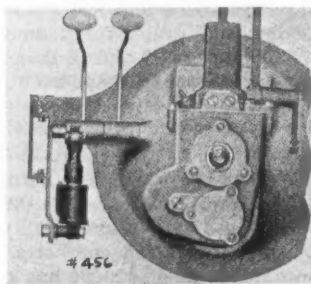
To take out the Modine radiator suspension core requires the removal of only four bolts and two gaskets. The radiator is designed so as to permit fitting either the Modine tubular or spirex core. The frame consists of only three pieces. The core is equipped with a shallow, reinforced header tank and is drawn against the radiator upper tank by two cap screws. Modine Radiator Co., Racine, Wis.



Dumore upholstery vacuum cleaner



Hill's illuminated oil gage for replacement on Fords



Pierce clutch governor prevents grabbing and sudden engagement



Perfecto Raydeflector permits the spotlight to shine through the windshield



Truck-Grip tire chains

PIERCE CLUTCH GOVERNOR PREVENTS GRABBING

The Pierce Clutch governor is a dash pot about 2 in. in diameter and 6 in. long. The base is attached to a bracket (fastened either to the transmission case or to the frame of the car) and has a pivotal action. The other end connects to an extension on the bottom of the clutch pedal. Inside the dash pot is a fluid on which changes in temperature have practically no effect.

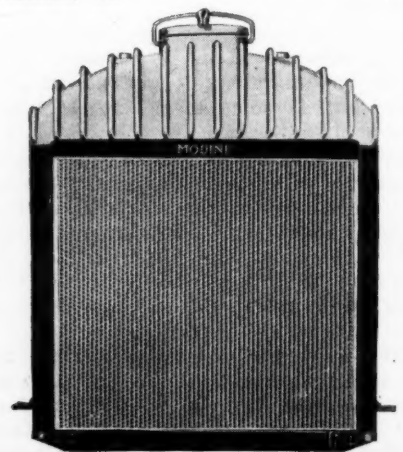
As the clutch pedal is pressed down the piston inside the cylinder raises with no resistance since the fluid passes freely through the poppet valves in the piston head. When the pedal is released, the piston starts to travel downward and forces the fluid through a by-pass and offers just enough resistance so that the clutch engages without jerk. A screw adjustment is provided so that the passage of the fluid can be regulated to suit each type of clutch. The Pierce Governor Co., Anderson, Ind.

TRUCK-GRIP TIRE CHAINS

These truck chains are snapped onto a permanent retaining ring attached to the spokes of the wheel. The cross links are loose and creep back and forth over the tire, preventing undue tire wear. The cross links are carried in the tool box when not needed. A set of chains consists of two retaining rings, 12 U-bolts and 12 cross chains, each having two snaps. Truck-Grip Chain Co., 2 Columbus Circle, New York.

HILL'S ILLUMINATED OIL GAGE

This gage is intended to replace the regular Ford gage. A wire running from the gage to the storage battery, or any other source of current, and connected to a switch on the dash, lights this gage and makes it an easy matter to ascertain the amount of oil in the crankcase. Price \$2.50. G. L. Hills Co., Franklin, Ill.



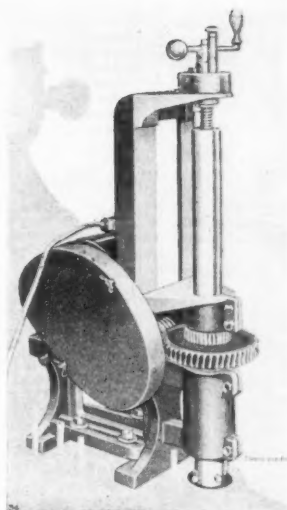
Modine radiator for Ford trucks

Service Equipment

Time Savers for the Shop

WEPPLIO REBORING MILL AND MICROMETER

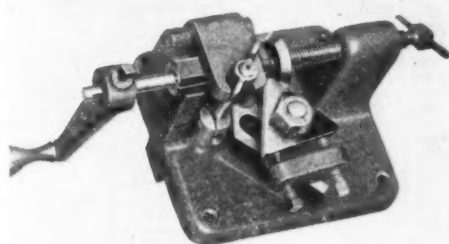
The portable electric Wepplo reboring mill shown, will rebores cylinders up to 14 in. in length and from 2½ in. to 6 in. in diameter. The device weighs 160 lbs. set, including the ¼ hp. motor. Centering of the boring tool is facilitated by special entering disks. The spindle is driven at 25 r.p.m. for boring and at 100 r.p.m. for the polishing operation. The rate of speed of ¼ in. per minute is maintained by the automatic feed screw. An emery wheel attachment with removable bracket is supplied for sharpening the cutting tools. The machine will rebores and polish the present day removable head type of blocks without their removal from the frame. Price \$295 f. o. b. Chicago. The special Wepplo micrometer enables the operator to instantly set the boring tool to the exact dimension desired. Price \$25—The Wepplo Machine and Tool Co., 5340 Montrose ave., Chicago.



Wepplo reboring mill and micrometer

TRIANGLE VALVE REFACTOR

The Triangle valve refacer possesses commendable features of design. Those worthy of note are: the three-edged cutter, range of adjustment from 25 to 90 deg., compact and rigid construction. The triangular cutter is adjustable to varying angles of valve face by the movement of two set screws. Valve stems are held securely in split sleeves, which are adjustable by means of the toggle bolt and wing nut. The feed screw is of ½ in. diam., and a ball is counter-sunk in the end of this screw, which provides accurate and rigid centering of valve head. Price \$12.—L. H. Riggs and Son, 527 Milton st., Cincinnati.

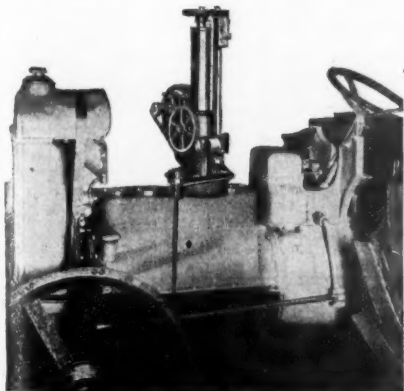


Triangle valve refacer

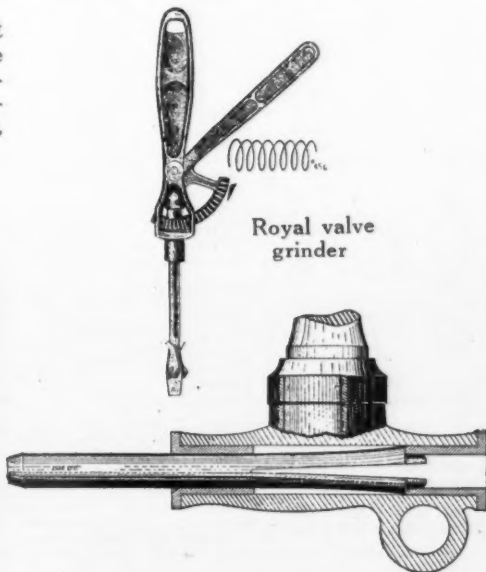
where the casting itself does not serve as a guide. Particularly suitable for removing spindle bushings, tie rod bushings and spring perch bushings, it is made in two sizes, one for the Ford and one for the Dodge. These two sizes will fit many other makes of cars. Frank Rose Mfg. Co., Hastings, Nebr.

ROSE BUSHING REMOVER

This bushing remover has a steel drift split to give it tension. On the end are two small pivots which keep the remover in correct alignment on the bushing when it is used for drift bushings,



Storm motor-driven cylinder reboring machine



Rose bushing remover

STORM MOTOR DRIVEN CYLINDER REBORING MACHINE

This machine is designed to meet the requirements of the garage where electric current is available. It is built heavy and rigid, using the Storm power machine cutter heads.

These heads are supported by a rigid, hardened steel bar, which is ground to accuracy and exact size. Extra long, heavy machine bearings give rigid support to the bar. These bearings are adjustable so as to take up any play and can be easily kept in perfect adjustment. Cutter gears are used throughout and a heavy internal feed screw and gears control the feed bar. Total capacity is 2½ to 6 in., sufficient to take care of practically all sizes in common use. The machine is furnished for boring only or for both boring and burnishing, and weighs approximately 300 lbs. Storm Mfg. Co., 406 6th Ave. So., Minneapolis.

HYRATE BATTERY AND JAR GRIPPER

The Hyrate Battery and Jar Gripper is an equipment for holding battery and jar and making pulling elements easy. The removal of an element from a battery jar requires considerable force, due to the expansion or buckling of the plates. In the old method of holding the battery against the floor with one foot, while pulling out an element, the battery man often breaks the covers. To attempt to grip a jar in this manner does not permit a strong pull, and often results in breaking the jar itself. Price \$9.50. Service Station Supply Co., 30 E. Larned st., Detroit.

ROYAL VALVE GRINDER

The Royal valve grinder is of the oscillating type and is actuated by the up and down motion of a long handle. The valve spring furnished with the grinder raises the valve from its seat when the hand is lifted. Ball-bearings in the bevel gear make it easy of operation. Universal Equipment & Supply Co., Syracuse, N. Y.



Hyrate battery and jar gripper

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan	NAME AND MODEL	Engine Make	Cylinders, Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ambassador.....R	Cont.	6-3 1/2 x 5 1/4	136	33x5	.....	14500	14500	.....	16500	Maxwell.....25	Own.	4-3 3/4 x 4 1/2	109	31x4	\$ 885	\$ 885	.....	1385	1485
American.....C	H-S.	6-3 1/2 x 5	127	32x4	\$2195	2195	2350	.....	3150	McFarlan.....1921	Own.	6-4 1/2 x 6	140	33x5	6300	6300	6300	7500	7500
Anderson.....Series 40	Cont.	6-3 1/2 x 4 1/2	120	33x4	1650	1650	1795	\$2450	2550	Mercer.....Series 5	Own.	4-3 3/4 x 6 1/2	132	32x4 1/2	3950	3950	3950	4850	5250
Apperson.....8-21-S	Own.	8-3 1/2 x 5	130	34x4 1/2	.....	3000	3250	4500	4500	Merit.....	Cont.	6-3 3/4 x 4 1/2	119	32x4	1985	1985	.....	.....	.....
Apperson.....Anniversary	Own.	8-3 1/2 x 5	130	34x4 1/2	.....	3500	3750	.....	.....	Meteor.....R & RR	Dues.	4-4 1/2 x 6	129	32x4 1/2	5500	5500	.....	.....	.....
Auburn.....6-51	Cont.	6-3 1/2 x 4 1/2	121	32x4	1670	1695	1760	2475	2495	Metz.....M6	Rut.	6-3 3/4 x 5	120	32x4	1995	1995	.....	2795	2895
Beggs.....20T	Cont.	6-3 1/2 x 4 1/2	120	33x4	1775	1520	.....	2320	2420	Mitchell.....F-40	Own.	6-3 1/2 x 5	120	32x4	1790	1790	.....	.....	.....
Bell.....4-32	H-S.	4-3 1/2 x 5	114	31x4	.....	1495	.....	.....	.....	Mitchell.....F-40	Own.	6-3 1/2 x 5	120	32x4	1490	1490	.....	.....	.....
Bell.....6-50	H-S.	6-3 1/2 x 5	124	32x4	.....	1695	.....	.....	.....	Mitchell.....F-42	Own.	6-3 1/2 x 5	127	33x4	.....	1795	.....	.....	.....
Biddle.....B1 & B5	Buda.	4-3 1/2 x 5 1/2	121	32x4	3475	3475	.....	4750	.....	Mitchell.....F-45	Own.	6-3 1/2 x 5	120	32x4	.....	.....	2290	2440	.....
Birch Super-Four.....	H-S.	4-3 1/2 x 5	117	33x4	1195	1195	1245	.....	1795	Moller.....A	Own.	4-2 1/2 x 4	100	27x3 1/2	2000	.....	.....	.....	.....
Birch Light Four.....	Leit.	4-3 1/2 x 4 1/2	108	30x3 1/2	995	995	.....	.....	.....	Monroe.....S-9 & 10	Own.	4-3 1/2 x 4 1/2	115	32x3 1/2	1285	1295	.....	.....	.....
Birch Light Six.....	H-S.	6-3 1/2 x 5	117	33x4	1395	1395	1445	.....	1995	Monroe.....S-11 & 12	Own.	4-3 1/2 x 4 1/2	115	33x4	.....	.....	2075	2175	.....
Bour-Davis.....21S	Cont.	6-3 1/2 x 4 1/2	126	33x4 1/2	2385	2385	2385	.....	.....	Moon.....6-48	Cont.	6-3 1/2 x 4 1/2	122	32x4	1785	1785	2285	2785	.....
Brewster.....91	Own.	4-4 x 5 1/2	125	32x4 1/2	7000	7000	.....	10500	.....	Moon.....6-68	Cont.	6-3 1/2 x 4 1/2	125	32x4 1/2	.....	2285	.....	.....	.....
Buick.....1922-34-35-36-37	Own.	6-3 1/2 x 4 1/2	109	31x4	935	975	.....	1475	1650	Murray-Mac Six.....	Own.	6-3 1/2 x 4 1/2	128	34x4 1/2	4250	4250	4250	.....	.....
Buick.....1922-44-5-6-7	Own.	6-3 1/2 x 4 1/2	118	33x4 1/2	1495	1525	.....	2135	2435	Nash.....681-7	Own.	6-3 1/2 x 5	121	33x4	1525	1545	1695	2395	2605
Buick.....1922-48-9-50	Own.	6-3 1/2 x 4 1/2	124	34x4 1/2	.....	.....	1735	2325	2635	Nash.....682	Own.	6-3 1/2 x 5	127	34x4 1/2	.....	1695	.....	.....	.....
Bush.....E.C.4	Lyc.	4-3 1/2 x 5	116	33x4	.....	1195	.....	.....	.....	Nash Four.....41-4	Own.	4-3 1/2 x 5	112	32x4 1/2	1025	1045	1645	1835	.....
Bush.....E.C.6	Rut.	6-3 1/2 x 5	116	33x4	.....	1345	.....	1750	1850	National Sextet.....BB	Own.	6-3 1/2 x 5 1/2	130	32x4 1/2	2900	2990	2990	4140	4240
Cadillac.....61	Own.	8-3 1/2 x 5 1/2	132	33x5	3790	3790	3940	4690	4950	Noma.....1C	Cont.	6-3 1/2 x 4 1/2	128	32x4 1/2	2800	2850	3200	.....	3700
Case.....V	Cont.	6-3 1/2 x 5 1/2	126	34x4 1/2	2250	2250	2900	3285	.....	Norwalk.....430-KS	Lyc.	4-3 1/2 x 5	116	32x3 1/2	.....	1035	.....	.....	.....
Chalmers.....6-30	Own.	6-3 1/2 x 4 1/2	117	32x4	1245	1295	.....	1995	2295	Oakland.....34-D	Own.	6-2 1/2 x 4 1/2	115	32x4	1095	1145	1265	1625	1725
Chalmers.....6-30	Own.	6-3 1/2 x 4 1/2	122	33x4 1/2	.....	1395	.....	.....	.....	Ogden.....6-T	Cont.	6-3 1/2 x 5 1/2	134	33x5	4250	4250	4375	5200	5500
Champion.....Tourist	Lyc.	4-3 1/2 x 5	113	32x3 1/2	.....	995	1050	.....	.....	Oldsmobile.....43-A	Own.	4-3 1/2 x 5 1/2	115	32x4	1145	1145	.....	1645	1845
Champion.....Special	H-S.	4-3 1/2 x 5	118	32x4	1295	1295	.....	.....	.....	Oldsmobile.....37-A	Own.	6-2 1/2 x 4 1/2	112	32x4	1450	1450	.....	2145	2145
Chandler.....Six	Own.	6-3 1/2 x 5	123	33x4	1785	1785	2785	2885	.....	Oldsmobile.....46	Own.	8-2 1/2 x 4 1/2	122	33x4 1/2	1735	1735	.....	2635	2635
Chevrolet.....490	Own.	4-3 1/2 x 4	102	30x3 1/2	525	525	.....	875	875	Oldsmobile.....47	Own.	8-2 1/2 x 4 1/2	115	32x4	1625	1625	.....	2185	2425
Chevrolet.....FB	Own.	4-3 1/2 x 5 1/2	110	32x4	975	975	.....	1575	1575	Overland.....4	Own.	4-3 3/4 x 4	100	30x3 1/2	595	595	.....	850	895
Cleveland.....40	Own.	6-3 x 4 1/2	112	32x4	1295	1295	.....	2195	2295	Packard.....Single-Six	Own.	6-3 3/4 x 4 1/2	116	33x4 1/2	2350	2350	.....	3125	3350
Climber Four.....K	H-S.	4-3 1/2 x 5	115	33x4	1385	1385	.....	.....	.....	Packard.....Twin Six	Own.	12-3 x 5	136	33x5	4850	4850	4850	6600	6800
Climber Six.....S	H-S.	6-3 1/2 x 5	125	32x4 1/2	2250	2250	3000	3100	.....	Paige.....6-44	Own.	6-3 1/2 x 5	119	32x4	1635	1635	.....	2450	2570
Cole.....870	Rut.	8-3 1/2 x 4 1/2	127	33x5	2485	2485	3385	3685	.....	Paige.....6-66	Cont.	6-3 3/4 x 5	131	33x4 1/2	12975	12975	2875	3755	3830
Columbia.....Challenger	Own.	6-3 1/2 x 5	115	32x4	1195	1195	1995	1995	.....	Pan American.....6-55	H-S.	6-3 3/4 x 5	121	33x4	2000	2000	2100	.....	.....
Columbia.....D-C&S	Cont.	6-3 1/2 x 5 1/2	125	32x4	1475	1475	2295	2350	.....	Parenti.....1921	Own.	6-3 3/4 x 5	125	32x4	2000	2000	.....	3000	.....
Comet.....C-53	Cont.	6-3 1/2 x 5 1/2	125	33x4 1/2	.....	2350	2450	.....	.....	Pateron.....650	Own.	6-3 3/4 x 5	120	33x4	.....	1595	1625	2605	2695
Commonwealth.....44	H-S.	4-3 1/2 x 5	117	32x4	3000	3000	.....	4500	.....	Peerless.....56-S-7	Own.	8-3 3/4 x 5	125	34x4 1/2	.....	2880	2880	3500	3790
Crawford.....21-6-40	Own.	6-3 1/2 x 5 1/2	122 1/2	32x4	1195	1295	.....	.....	.....	Piedmont.....4-30	Lyc.	4-3 1/2 x 5	116	32x3 1/2	.....	970	.....	.....	.....
Crow-Elkhart.....L53-65	Lyc.	4-3 1/2 x 5	117	32x3 1/2	1195	1295	.....	.....	.....	Piedmont.....6-40	Cont.	6-3 3/4 x 4 1/2	122	32x4	.....	1285	.....	.....	.....
Crow-Elkhart.....S63-65	H-S.	6-3 1/2 x 5	117	33x4	1545	1545	.....	2395	.....	Pierce-Arrow.....	Own.	6-4 x 5 1/2	138	33x5	7000	16500	6500	8000	8500
Daniels.....D-19	Own.	8-3 1/2 x 5 1/2	132	34x4 1/2	5350	5350	6250	6950	.....	Pilot.....6-45	Teetor	6-3 1/2 x 5	120	32x4	1945	1895	.....	.....	.....
Davis.....61-67	Cont.	6-3 1/2 x 4 1/2	120	32x4	1895	1695	2050	2595	.....	Pilot.....6-50	H-S.	6-3 1/2 x 5	126	32x4 1/2	2285	2285	2335	3350	3400
Dispatch.....Wise	Own.	4-3 1/2 x 5	120	34x4	1250	1350	1525	1575	.....	Porter.....46	Own.	4-4 x 6 1/2	142	35x5	6750	6750	6750	7600	.....
Dixie Flyer.....H-S-70	H-S.	4-3 1/2 x 5	112	32x4	1345	1345	1545	1995	.....	Premier.....6-D	Own.	6-3 3/4 x 5 1/2	126 3/4	33x5	3790	13690	3890	4690	5190
Dodge Brothers.....	Own.	4-3 1/2 x 4 1/2	114	32x4	935	985	1585	1785	.....	Premcar.....6-40 A	Falls	6-3 3/4 x 4 1/2	117	32x4	1295	1295	.....	1945	1995
Dorris.....6-80	Own.	6-4 x 5	102	33x5	.....	4785	4785	5800	6290	Raleigh.....A-60	H-S.	6-3 1/2 x 5	122	32x4 1/2	2250	2250	.....	3100	3200
Dort.....17-12	D-Ly.	4-3 1/2 x 5	108	31x4	985	985	1535	1685	.....	R & V Knight.....R	Own.	4-3 3/4 x 5	116	32x4	.....	1500	.....	2650	2700
Driggs.....	Own.	4-2 1/2 x 4 1/2	104	30x3 1/2	1275	1275	.....	1975	.....	R & V Knight.....J	Own.	6-3 3/4 x 5	127	32x4 1/2	3350	3350	3350	4000	4200
Du Pont.....A	Own.	4-3 1/2 x 5 1/2	124	32x4 1/2	3400	3400	.....	4900	.....	Ranger 22-4.....A-B-C-D	Own.	4-3 3/4 x 5	116	32x4	1485	1485	.....	.....	.....
Durant.....A-22	Cont.	4-3 3/4 x 4 1/2	109	31x4	.....	890	.....	1365	1365	Ranger 22-6.....A-B-C-D	Own.	6-3 1/2 x 5	123	33x4 1/2	3550	3550	.....	.....	.....
Earl.....4-40	Own.	4-3 1/2 x 5 1/2	112	32x4	1375	1285	.....	1995	.....	Reo Series A & B T & U	Own.	6-3 1/2 x 5	120	33x4	1650	1650	1685	2700	2750
Elcar.....K-4	Lyc.	4-3 1/2 x 5	117	33x4	1145	1145	1195	1645	.....	ReVer.....C	Dues.	4-4 1/2 x 6	131	32x4 1/2	4850	4650	14650	6500	.....
Elcar.....7-R	Cont.	6-3 1/2 x 4 1/2	117	33x4	1595	1595	2395	2495	.....	Roamer.....6-54-E	Cont.	6-3 1/2 x 5 1/2	128	32x4 1/2	2750	2485	2750	3350	3950
Elgin.....K-1	Falls.	6-3 1/2 x 4 1/2	118	33x4	1505	1495	1595	2395	.....	Roamer.....4-75-E	Dues.	4-4 1/2 x 6	128	32x4 1/2	3850	3650	.....	.....	.....
Essex.....	Own.	4-3 3/4 x 5	108 1/2	32x4	1195	1195	.....	1395	1995	Rolls-Royce.....	Own.	6-4 1/2 x 4 1/2	143 1/2	33x5	U. S. Chassis	Price	11750	.....	.....
Fergus.....S-5-21	Own.	6-3 1/2 x 5	126	33x4 1/2	.....	Chassis Price	8500	.....	.....	Romer.....	Cont.	6-3 1/2 x 4 1/2	120	33x4	2000	2000	2100	2450	2750
Ferris.....C-20	Cont.	6-3 1/2 x 5 1/2	130	32x4 1/2	2695	2695	.....	3695	.....	Saxon.....125	Own.	4-3 1/2 x 5	112	32x4	1345	1295	.....	1995	1995
Ford.....T	Own.	4-3 3/4 x 4	109	30x3 1/2	*325	1355	.....	595	660	Sayers Six.....DP	Cont.	6-3 1/2 x 4 1/2	118	33x4	1735	1705	.....	2665	.....
Franklin.....9-B	Own.	6-3 1/2 x 4	115	32x4	2300	2350	.....	2650	3350	Seneca.....L & O	Leit.	4-3 1/2 x 4 1/2	108	30x3 1/2	1045	1045	.....	.....	.....
Gardner.....T-R & G	Lyc.	4-3 1/2 x 5	112	32x3 1/2	1095	1095	.....	1695	.....	Seyverin.....Six	Cont.	6-3 1/2 x 5 1/2	122 1/2	33x4 1/2	1485	1485	.....	2100	2250
Grant.....Six	Own.	6-3 1/2 x 4 1/2	116	32x4	1550	1550	.....	2450	2450	Seyverin.....Six	Cont.	6-3 1/2 x 5 1/2	122 1/2	33x4 1/2	2550	2550	2550	3250	3350
H.C.S.....	Weid.	4-3 3/4 x 5 1/2	120	32x4 1/2	2725	2775	.....	3450	3650	Skelton.....35	Lyc.	4-3 1/2 x 5	112	32x3 1/2	995	995	.....	.....	.....
Halladay, Manh. Special	Rut.	6-3 1/2 x 5	118	33x4	.....	1595	.....	.....	.....	Southern Six.....660-2	H-S.	6-3 1/2 x 5	127	32x4 1/2					

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Acason	3/4	\$1650	3 1/2 x 5	34x5 1/2	34x5 1/2	W	Corbitt, H	3/4-1	\$1800	3 1/2 x 5	35x5 1/2	35x5 1/2	B	Garford, 68D	5	\$5200	5 x 6 1/2	36x6	40x6d	W
Acason, R	1	2260	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Corbitt, E	1	2200	3 1/2 x 5	34x3 1/2	34x4	W	Garford, 77D	3 1/2	4300	4 1/2 x 6	36x5	38x6d	W
Acason, RB	1 1/2	2485	3 1/2 x 5 1/2	36x3 1/2	36x6	W	Corbitt, D	1 1/2	2600	3 1/2 x 5	36x3 1/2	36x5	W	Garford, 150-A	7 1/2	5500	5 1/2 x 6 1/2	36x6	40x7d	W
Acason, H	2 1/2	3295	4 1/2 x 5 1/2	36x4	36x8	W	Corbitt, C	2	3150	4 1/2 x 5 1/2	36x3 1/2	36x7	W	Gary, F	1	2100	3 1/2 x 5	36x3 1/2	36x4	W
Acason, L	3 1/2	4295	4 1/2 x 5 1/2	36x5	36x10	W	Corbitt, B	2 1/2	3300	4 1/2 x 5 1/2	36x4	36x7	W	Gary, I	1 1/2	2550	4 x 5 1/2	36x3 1/2	36x5	W
Acason, M	5	5250	5 x 6 1/2	36x6	40x12	W	Corbitt, A	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x10	W	Gary, J	2 1/2	3150	4 1/2 x 5 1/2	36x4	36x7	W
Ace, C	1 1/2	2295	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Corbitt, AA	5	5000	4 1/2 x 6	36x6	40x6d	W	Gary, K	3 1/2	4050	4 1/2 x 6	36x5	40x5d	W
Ace, A	2 1/2	2795	4 1/2 x 5 1/2	36x4	36x7	W	Day-Elder, A	1	2100	3 1/2 x 5	34x3 1/2	34x4	W	Gary, M	5	5150	5 x 6 1/2	36x6	40x6d	W
Acme, G	3/4	.....	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Day-Elder, B	1 1/2	2300	3 1/2 x 5	34x3 1/2	34x5	W	Gersix, M	1 1/2	3100	4 x 5 1/2	36x3 1/2	36x7	W
Acme, B	1	.....	3 1/2 x 5	34x3 1/2	34x5	W	Day-Elder, D	2	2750	4 1/2 x 5 1/2	36x4	36x7	W	Gersix, K	2 1/2	3500	4 1/2 x 5 1/2	36x4	36x8	W
Acme, F	1 1/2	.....	3 1/2 x 5	34x3 1/2	34x5	W	Day-Elder, C	2 1/2	3025	4 1/2 x 5 1/2	36x4	36x7	W	Gersix, J	3 1/2	4500	4 1/2 x 6	36x5	40x12	W
Acme, A	2	.....	4 1/2 x 5 1/2	36x4	36x7	W	Day-Elder, F	3 1/2	3750	4 1/2 x 5 1/2	36x5	36x5d	W	Golden West, GH	3	4500	4 1/2 x 6	36x7	36x7	W
Acme, AC	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x7	W	Day-Elder, E	5	4250	4 1/2 x 6	36x5	40x6d	W	Golden West, G	3 1/2	5000	4 1/2 x 6 1/2	36x6	36x6	W
Acme, C	3 1/2	.....	4 1/2 x 5 1/2	36x5	40x10	W	Dearborn, B	1	1700	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W	Graham Bros. A	1 1/2	2495	3 1/2 x 5	35x5 1/2	36x6 1/2	I
Acme, E	5	.....	4 1/2 x 6	36x6	40x12	W	Dearborn, FX	1 1/2	2300	3 1/2 x 5 1/2	34x4	34x5	W	Gramm-Bern, 10	1	1365	3 1/2 x 5	33x5 1/2	33x5 1/2	B
Akr'n Multi-Trk20	1 1/2	1695	4 x 5 1/2	34x5	34x5	B	Dearborn, 48	2 1/2	2180	3 1/2 x 5 1/2	34x4	34x5	W	Gramm-Bern, 15	1 1/2	2050	3 1/2 x 5	36x3 1/2	36x5	W
American, 25	2 1/2	3350	4 x 6	36x4	36x4d	W	Defiance, C	1	1605	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Gramm-Bern, 65	1 1/2	2725	3 1/2 x 5	36x3 1/2	36x5	W
American, 40	4	4275	4 1/2 x 6	36x5	36x5d	W	Defiance, D	1 1/2	2055	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Gramm-Bern, 20	2	3175	4 1/2 x 5 1/2	36x4	36x7	W
Apex, G	1	1450 1/2	3 1/2 x 5	33x5 1/2	33x5 1/2	I	Defiance, E	2	2275	3 1/2 x 5	35x5 1/2	35x5 1/2	I	Gramm-Bern, 25	2 1/2	3575	4 1/2 x 5 1/2	36x4	36x4d	W
Apex, D	1 1/2	1915	3 1/2 x 5 1/2	34x3 1/2	34x4	I	DeKalb, E2 1/2	2 1/2	2600	4 1/2 x 5 1/2	36x4	36x6	W	Gramm-Bern, 35	3 1/2	4375	4 1/2 x 5 1/2	36x5	40x5d	W
Apex, E	2 1/2	2695	4 1/2 x 5 1/2	36x4	36x7	I	DeKalb, E2 1/2	2 1/2	2600	4 1/2 x 5 1/2	36x4	36x6	W	Gramm-Bern, 50	5	5275	4 1/2 x 6	36x6	40x6d	W
Apex, F	3 1/2	3975	4 1/2 x 6	36x5	36x10	I	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hahn, J4	1	.....	3 1/2 x 5	34x5	34x5	W
Armleder, 20	1	.....	3 1/2 x 5 1/2	34x3 1/2	34x5	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hahn, CD	1 1/2	.....	4 1/2 x 5 1/2	36x3 1/2	36x6	W
Armleder, HW	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x7	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hahn, EE	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x8	W
Armleder, KW	3 1/2	.....	4 1/2 x 6	36x5	36x5d	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hahn, F	3 1/2	.....	4 1/2 x 5 1/2	36x5	36x10	W
Atco, B	1 1/2	.....	3 1/2 x 5 1/2	34x3 1/2	34x5	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hahn, EF	5	.....	4 1/2 x 6	36x6	40x12	W
Atco, B1	1 1/2	.....	3 1/2 x 5 1/2	34x3 1/2	34x5	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hal-Fur, E	1	2200	4 x 5	35x5 1/2	35x5 1/2	W
Atco, A	2 1/2	.....	4 1/2 x 5 1/2	36x4	36x8	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hal-Fur, B	2 1/2	3000	4 1/2 x 5 1/2	36x5	38x7	W
Atlas, M.D.	1	1185	3 1/2 x 5	32x4 1/2	32x4 1/2	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hal-Fur, F	3 1/2	4000	4 1/2 x 5 1/2	36x6	40x10	W
Atterbury, 20R	1 1/2	2475	3 1/2 x 5	34x3 1/2	34x5	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hall, 1 1/2	1 1/2	3100	3 1/2 x 5	34x5 1/2	38x7 1/2	W
Atterbury, 7CX	2 1/2	3175	4 1/2 x 5 1/2	36x4	36x4d	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hall, 2 1/2	2 1/2	3275	4 1/2 x 5 1/2	36x4	36x6	W
Atterbury, 7D	3 1/2	3975	4 1/2 x 5 1/2	36x5	40x5d	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hall, 3 1/2	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	W
Atterbury, 8E	5	4975	4 1/2 x 6	36x5	40x6d	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hall, 5	5	5100	4 1/2 x 5 1/2	36x5	40x6d	W
Autocar, 21UF	1 1/2	2300	4 1/2 x 1 1/2	34x4	34x5	D	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hall, 7 chain	7	5100	4 1/2 x 5 1/2	36x5	40x6d	C
Autocar, 21UG	2 1/2	2400	4 1/2 x 1 1/2	34x4	34x5	D	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Harvey, WEA	1 1/2	2550	4 1/2 x 5 1/2	34x4	34x5	W
Autocar, 26Y	.....	4350	4 1/2 x 5 1/2	36x6	36x12	D	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Harvey, WOA	2	2950	4 1/2 x 5 1/2	34x4	34x7	W
Autocar, 26-B	.....	4500	4 1/2 x 5 1/2	36x6	36x12	D	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Harvey, WFA	2 1/2	3300	4 1/2 x 5 1/2	36x4	36x7	W
Available, H1 1/2	1 1/2	2475	4 x 5 1/2	36x3 1/2	36x5	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Harvey, WHA	3 1/2	3950	4 1/2 x 6	36x5	36x5d	W
Available, H2	2	2775	4 x 5 1/2	36x3 1/2	36x6	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Harvey, WKA	5	4500	4 1/2 x 6	36x6	40x6d	W
Available, H2 1/2	2 1/2	3475	4 x 5 1/2	36x4	36x8	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hawkeye, K	1 1/2	1850	3 1/2 x 5 1/2	34x3 1/2	34x5	I
Available, H3 1/2	3 1/2	4175	4 1/2 x 5 1/2	36x5	40x5d	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hawkeye, M	2	2650	4 1/2 x 5 1/2	36x4	36x6	I
Available, H5	5	5375	4 1/2 x 6	36x6	40x12	W	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hawkeye, N	3 1/2	3700	4 1/2 x 5 1/2	36x5	36x10	I
Available, H7	7	6000	5 x 6	36x6	40x14	B	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hendrickson, N	2 1/2	3150	4 1/2 x 5 1/2	36x4	36x7	W
Avery	1	.....	3 x 4	31x5 1/2	34x5 1/2	I	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Hendrickson, M	3 1/2	3975	4 1/2 x 5 1/2	36x5	36x5d	W
Beck, A Jr.	1	1950	3 1/2 x 5	34x3 1/2	34x4	I	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Huffman, B	1 1/2	1995	3 1/2 x 5	34x3 1/2	34x6	W
Beck, C	2	2550	4 1/2 x 5 1/2	36x4	36x6	I	DeKalb, E2 1/2	2 1/2	2250	4 1/2 x 5 1/2	36x4	36x5	W	Huffman, C	1 1/2	1795	3 1/2 x 5	34x3 1/2	34x6	I
Bell, M	1	1495	3 1/2 x 5	35x5	35x5 1/2	W	DeKalb, E2													

Specifications of Current Motor Truck Models—Continued

List of Current Motor Truck Models—Continued																				
NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Kelly-S., K-45	4	\$4550	4 1/2 x 6 1/2	36x5	40x6d	C	Norwalk, 35E. Spec	1 1/2	2285	3 1/2 x 5 1/2	34x3 1/2	34x5	W	Southern, 15	1 1/2	\$2500	3 1/2 x 5 1/2	36x6 1/2	34x4	W
Kelly-S., K-50	4	4900	4 1/2 x 6 1/2	36x6	40x6d	C	O. K., K1	1 1/2	\$2675	4 x 5 1/2	36x3 1/2	36x5	W	Southern, 20	2	2990	4 1/2 x 5 1/2	36x6 1/2	40x8*	W
Kelly-S., K-60	4	5100	4 1/2 x 6 1/2	36x6	40x6d	C	O. K., L1	2 1/2	3450	4 1/2 x 5 1/2	36x4	36x8	W	Standard, 1-K	1-1 1/2	1800	3 1/2 x 5	36x6 1/2	34x5*	W
Keystone, 40	2 1/2	2450	3 1/2 x 5 1/2	34x5 1/2	38x7 1/2	I	O. K., M1	1 1/2	4250	4 1/2 x 6	36x5	36x5d	W	Standard, 76	2 1/2-3	2800	4 1/2 x 5 1/2	36x4	36x7*	W
Kimball, AB	2 1/2	3675	4 x 6	36x4	36x7	W	Ogden, A1	1 1/2	2375	3 1/2 x 5	36x3 1/2	36x5	W	Standard, 66	3 1/2-4	3600	4 1/2 x 5 1/2	36x5	36x10	W
Kimball, AC	3	3975	4 1/2 x 6	36x4	36x8	W	Ogden, E	1 1/2	2975	3 1/2 x 5	36x4	36x7	W	Sterling, 1 1/2	5-7	4400	4 1/2 x 6	36x6	40x12	W
Kimball, AE	4	4500	4 1/2 x 6	36x4	36x10	W	Old Hickory, W	1 1/2	2175	3 1/2 x 5	36x3 1/2	36x4*	W	Sterling, 2	1 1/2	2885	4 x 5 1/2	36x3 1/2	36x5*	W
Kimball, AF	5	5000	4 1/2 x 6	36x5	40x12	W	Old Reliable, A	1 1/2	2350	4 x 5	34x4	36x6	W	Sterling, 2 1/2	2 1/2	3095	4 x 5 1/2	36x4	36x6	W
Kissel, Express	1	1985 1/2	3 1/2 x 5 1/2	34x5 1/2	34x5 1/2	W	Old Reliable, B	2 1/2	3500	4 1/2 x 6	36x4	36x4d	W	Sterling, 3 1/2	3 1/2	3290	4 1/2 x 6 1/2	36x4*	36x4d*	W
Kissel, Utility	1 1/2	1975	3 1/2 x 5 1/2	36x3 1/2	36x5	W	Old Reliable, C	3 1/2	4250	4 1/2 x 6	36x5	36x5d	W	Sterling, 5-W	5	4950	5 x 6 1/2	36x6*	40x6d*	W
Kissel, Freight	2 1/2	2875	4 1/2 x 5 1/2	36x4	36x7	W	Old Reliable, KLM	7	6000	4 1/2 x 6 1/2	36x6	40x7d	C	Sterling, 5-C	5	5500	5 x 6 1/2	36x6	40x6d	W
Kissel, H. D.	4	3675	4 1/2 x 5 1/2	36x5	36x7	W	Oldsmobile Econ.	1	1095	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	I	Stewart, 14	7 1/2	6000	5 x 6 1/2	36x6	40x6d	C
Kleiber, AA	1 1/2	2600	4 1/2 x 5 1/2	36x3 1/2	36x5*	W	Olympic, A	2 1/2	3500	4 1/2 x 5 1/2	36x4	36x7	W	Stewart, 15	4	1395	3 1/2 x 5 1/2	36x6	40x7d	W
Kleiber, BB	2	3100	4 1/2 x 5 1/2	36x4	36x7*	W	Oshkosh, A	2	3750	3 1/2 x 5	36x6 1/2	36x7	W	Stewart, 9	1 1/2	1875	3 1/2 x 5	36x5 1/2	36x5 1/2	W
Kleiber, B	2 1/2	3600	4 1/2 x 5 1/2	36x5*	36x8	W	Oshkosh, AA	2	3850	3 1/2 x 5	36x6 1/2	36x7	W	Stewart, 7	2	2200	3 1/2 x 5	36x4 1/2	36x4	I
Kleiber, C	3	4000	4 1/2 x 5 1/2	36x5	36x5d	W	Oshkosh, BB	2 1/2	4150	4 x 5 1/2	38x7 1/2	38x7 1/2	W	Stewart, 7-X	2 1/2	2800	4 1/2 x 5 1/2	36x4	36x7	I
Koehler, D	1 1/2	5300	5 x 6 1/2	36x6	40x12	W	Packard, EC	1 1/2-3	3500	4 1/2 x 5 1/2	36x4	36x7	W	Stewart, 10	3 1/2	3850	4 1/2 x 5 1/2	36x5	36x5d	I
Koehler, M	2 1/2	1995	3 1/2 x 5	34x3 1/2	34x5	W	Packard, EX	1 1/2-3	4000	4 1/2 x 5 1/2	36x6 1/2	40x8 1/2	W	Stoughton, A	1	1995	3 1/2 x 5 1/2	36x4 1/2	36x5 1/2	W
Koehler, MCS	2 1/2	3175	4 x 5 1/2	36x4	36x7	W	Packard, ED	2-4 1/2	4100	4 1/2 x 5 1/2	36x5	36x5d	W	Stoughton, B	1 1/2	2350	3 1/2 x 5 1/2	36x4 1/2	36x5	W
Koehler, F	3 1/2	3275	4 x 5 1/2	36x5	36x10	W	Packard, EF	4-7 1/2	4500	5 x 5 1/2	36x6	40x6d	W	Stoughton, C	2	2800	4 1/2 x 5 1/2	36x4 1/2	36x7 1/2	W
Koehler, MT, Trac	5	4150	4 x 5 1/2	36x4	36x7	W	Paige, 52-19	1 1/2	2880	4 x 5 1/2	34x3 1/2	34x5	W	Stoughton, D	2	2900	4 x 5 1/2	36x4	36x7	W
Lange, B	2 1/2	3350	4 1/2 x 5 1/2	36x4*	36x7*	C	Paige, 54-20	2 1/2	3400	4 1/2 x 5 1/2	34x4	34x8	W	Sullivan, F	3	3600	4 1/2 x 5 1/2	36x5d	36x5d	W
Larrabee, X-Z	3-1	1925	3 1/2 x 4 1/2	34x5 1/2	34x5 1/2	C	Parker, F20	3 1/2	4285	4 1/2 x 5 1/2	36x5	36x5d	W	Sullivan, H	2	3350	4 1/2 x 5 1/2	36x4	36x7*	W
Larrabee, U	1 1/2	2400	3 1/2 x 4 1/2	34x5 1/2	34x5	W	Parker, J20	3 1/2	3500	4 x 6	34x4	36x4d	W	Superior, D	3 1/2	4650	4 1/2 x 6	36x5	36x5d	W
Larrabee, K	2 1/2	3200	3 1/2 x 5	36x4	36x7	W	Parker, M20	3 1/2	4400	4 1/2 x 6	36x5	40x5d	W	Superior, E	1	1650	4 1/2 x 5	36x4 1/2	36x4	I
Larrabee, L-4	3 1/2	4000	4 1/2 x 5 1/2	36x5	36x5d	W	Patriot, Washg'tn	5	5500	4 1/2 x 6	36x6	40x6d	W	Super Truck, 50	2 1/2	3300	4 x 6	36x4	36x8	W
Larrabee, W	5	4900	4 1/2 x 6	36x6	40x6d	W	Piedmont, 4-30	1	3000	4 1/2 x 5 1/2	36x4*	36x7*	W	Super Truck, 100	3 1/2	4300	4 1/2 x 6	36x5	40x5d	W
Luedinghaus, C	1 1/2	1695	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Pierce-Arrow	2	1200	3 1/2 x 5	34x4 1/2	34x4 1/2	W	Super Truck, 150	5	5300	4 1/2 x 6	36x5	40x12	W
Luedinghaus, W	1 1/2	2400	3 1/2 x 5 1/2	34x3 1/2	34x5*	W	Pierce-Arrow	3 1/2	3200	4 x 5 1/2	36x4	36x4d	W	Texas, A38	3 1/2	6300	5 x 6	36x6	40x7d	W
Luedinghaus, K	2-2 1/2	3150	4 1/2 x 5 1/2	36x1*	36x7*	W	Pioneer, 59	1	4850	4 1/2 x 6 1/2	36x5	40x6d	W	Texas, TK39	1 1/2	1095	3 1/2 x 5	36x4	36x7	I
Maccari, L	1 1/2	2925	4 1/2 x 5 1/2	36x4	36x6	W	Pittsburger, C-21	3	1550	3 1/2 x 4 1/2	32x4 1/2	32x4 1/2	W	Tiffin, GW	1 1/2	1550	3 1/2 x 5	36x6	38x7	W
Maccari, H-A	2	3300	4 1/2 x 5 1/2	36x4	36x6d	W	Powder, F	2	3800	4 1/2 x 5 1/2	36x5*	36x7*	W	Tiffin, MW	2 1/2	2400	4 1/2 x 5 1/2	36x3 1/2	36x5	W
Maccari, M-4	3 1/2	4500	4 1/2 x 6	36x5	36x5d	W	Premcar, B-143	3 1/2	3400	3 1/2 x 5 1/2	36x6	36x6	W	Tiffin, PW	3 1/2	3100	4 1/2 x 5 1/2	36x4	36x3 1/2	W
Maccari, G	5	5500	4 1/2 x 6	36x5	40x6d	W	Rainier, R-21	1 1/2	4500	4 1/2 x 5 1/2	36x5	40x10	W	Tiffin, F50	5	4100	4 1/2 x 5 1/2	36x5	40x5d	W
MacDonald, A	7 1/2	5750	4 1/2 x 6	40x7	40x14	I	Rainier, R-19	3 1/2	2475	3 1/2 x 5	36x6 1/2	36x7	W	Tiffin, F60	6	4800	4 1/2 x 6	36x5	40x6d	W
Mack, AB D.R.	1 1/2	3150	4 x 5	36x4	36x4d	D	Rainier, R-16	1 1/2	1990	3 1/2 x 5	35x5 1/2	35x5 1/2	W	Titan, HT	5	4500	4 1/2 x 6	36x4	40x12	W
Mack, AB	2 1/2	3400	4 x 5	36x4	36x4d	D	Rainier, R-15	2 1/2	2150	3 1/2 x 5	34x3 1/2	34x5	W	Titan, HD	3 1/2	4550	4 1/2 x 6	36x4*	40x5d	I
Mack, AB Chain	1 1/2	3000	4 x 5	36x4	36x4d	D	Rainier, R-14	1 1/2	2490	3 1/2 x 5	34x4	34x6	W	Titan, TS	3 1/2	5400	4 1/2 x 6	36x5	40x6d	I
Mack, AB Chain	2	3300	4 x 5	36x4	36x4d	D	Rainier, R-13	2 1/2	2890	4 1/2 x 5 1/2	34x4	34x7	W	Tower, J	2 1/2	3400	4 1/2 x 5 1/2	36x4*	40x6d	I
Mack, AB D.R.	2	3300	4 x 5	36x4	36x4d	D	Rainier, R-12	2 1/2	3550	4 1/2 x 5 1/2	34x4	34x7	W	Tower, H	1 1/2	2900	4 1/2 x 5 1/2	36x5	38x7	W
Mack, AC Chain	3 1/2	3750	4 x 5	36x4	36x4d	D	Rainier, R-11	3 1/2	4400	4 1/2 x 5 1/2	36x5	36x5d	W	Tower, G	3 1/2	3200	4 1/2 x 5 1/2	36x4	36x7	W
Mack, AC Chain	5	4950	5 x 6	36x5	40x5d	D	Ranger, TK-22-2	5	5100	4 1/2 x 6	36x6	36x6d	W	Traffic, C	3	4100	4 1/2 x 5 1/2	36x5	36x5d	W
Mack, AC Chain	6 1/2	5750	5 x 6	36x6	40x6d	C	Reliance, 10A	3 1/2-4 1/2	2775	3 1/2 x 5	36x6 1/2	38x7 1/2	W	Transport, 20	1	1595	3 1/2 x 5	36x4 1/2	34x5*	I
Mack, AC Chain	7 1/2	6000	5 x 6	36x7	40x7d	C	Reliance, 20B	1 1/2	1245	4 1/2 x 4 1/2	34x4 1/2	34x4 1/2	B	Transport, 30	1 1/2	1395	3 1/2 x 5	36x4	36x7	I
Mack, AC Chain	10	5800	5 x 6	36x6	40x6d	C	Republic, 75	2 1/2	2400	4 x 5 1/2	36x3 1/2	36x5	I	Transport, 50	1 1/2	1995	3 1/2 x 5 1/2	36x3 1/2	36x4	I
Mack, AC Chain	13	5750	5 x 6	36x6	40x6d	C	Republic, 10</													

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive	NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES		Final Drive
				Front	Rear						Front	Rear						Front	Rear	
Watson, E	1	\$1895	3 1/2 x 5 1/2	35x5 1/2	35x5 1/2	W	Wichita, S	5	\$5000	4 1/2 x 6	36x6	40x6d	W	Winther, 39	1 1/2	\$2150	3 1/2 x 5	34x3 1/2	34x5	I
Watson, N	1 1/2	4250	4 1/2 x 5 1/2	36x5	36x10	W	Wilcox, AA	1	1900	3 1/2 x 5 1/2	36x4	36x4	W	Winther, 49	2	3250	4 x 5	34x4	34x4d	I
Western, W1 1/2	1 1/2	2550	4 1/2 x 5 1/2	36x3 1/2	36x5	W	Wilcox, BB	1 1/2	2550	4 1/2 x 5 1/2	36x4	36x5	W	Winther, 50	2 1/2	3995	4 x 6	38x7 1/2	42x9 1/2	I
Western, L1 1/2	1 1/2	2550	3 1/2 x 5	36x3 1/2	36x5	W	Wilcox, D	2 1/2	3000	4 1/2 x 5	36x4	36x3 1/2	W	Winther, 70	3 1/2	4200	4 x 6	36x5	36x5d	I
Western, W2 1/2	2 1/2	3250	4 1/2 x 5 1/2	36x4	36x7	W	Wilcox, E	3 1/2	3950	4 1/2 x 5	36x5	36x5d	W	Winther, 450	2 1/2	3600	4 x 5	34x5	36x6	I
Western, L2 1/2	2 1/2	3250	4 1/2 x 5	36x4	36x7	W	Wilcox, F	5	4350	4 1/2 x 5 1/2	36x5	40x6d	W	Winther, 109	5	5250	4 1/2 x 6	36x6	40x5d	I
Western, W3 1/2	3 1/2	4250	4 1/2 x 5 1/2	36x5	40x5d	B	Wilson, EA	1 1/2	2270	3 1/2 x 5	36x3 1/2	36x5	W	Winther, 140	1	5900	5 x 6	36x6	40x7d	I
White, 15	3/4	2400	3 1/2 x 5 1/2	34x5 1/2	34x5 1/2	D	Wilson, G	3 1/2	3885	4 1/2 x 5 1/2	36x4	36x7	W	Wisconsin, B	1	1950	4 x 5 1/2	34x5 1/2	34x5 1/2	W
White, 20	2	3250	3 1/2 x 5 1/2	36x5	40x5d	D	Wilson, H	3 1/2	3885	4 1/2 x 5 1/2	36x5	36x5d	W	Wisconsin, C	1 1/2	2500	4 1/2 x 5 1/2	36x6 1/2	36x6 1/2	W
White, 40	3 1/2	4200	3 1/2 x 5 1/2	36x5	40x5d	D	Winther, 751	1 1/2	1795	3 1/2 x 5	34x4 1/2	35x5 1/2	I	Wisconsin, D	2 1/2	3500	4 1/2 x 5 1/2	36x6	36x10	W
White, 45	5	4500	4 1/2 x 5 1/2	36x6	40x6d	D	Winther, 430	1 1/2	2350	3 1/2 x 5	32x4	32x4	I	Wisconsin, E	3 1/2	4000	5 x 6 1/2	36x6 1/2	36x12 1/2	W
White Hick, E	1	1225	3 1/2 x 5	34x5 1/2	34x5 1/2	W								Witt-Will, N	1 1/2	2750	3 1/2 x 5	36x3 1/2	36x5	W
White Hick, H	1 1/2	1375	3 1/2 x 5	36x3 1/2	36x5	W								Witt-Will, P	2 1/2	3250	4 1/2 x 5 1/2	36x3 1/2	36x7	W
White Hick, K	2 1/2	1675	4 1/2 x 5 1/2	36x4	36x5	W								Wolverine, J	1	2125	3 1/2 x 5	34x3	34x4	I
Wichita, K	1	2300	3 1/2 x 5 1/2	36x3 1/2	36x4	W								Wolverine, J	1 1/2	2375	3 1/2 x 5	34x3 1/2	34x5	I
Wichita, L	1 1/2	2600	3 1/2 x 5 1/2	36x3 1/2	36x5	W								Wolverine, J	2	2640	3 1/2 x 5	34x4	34x7	I
Wichita, M	2	2900	3 1/2 x 5 1/2	36x3 1/2	36x6	W								Wolverine, J	2 1/2	3425	4 1/2 x 5 1/2	36x5	36x10	I
Wichita, R	2 1/2	3000	3 1/2 x 5 1/2	36x4	36x7	W								Wolverine, L	3 1/2	4100	4 1/2 x 5 1/2	36x5	36x10	I
Wichita, RX	2 1/2	3600	4 1/2 x 5	36x4	36x8	W								Yellow Cab, M21	3 1/2	2050	3 1/2 x 5	32x4	32x4	B
Wichita, O	3 1/2	4000	4 1/2 x 5	36x5	36x5d	W								Yellow Cab, M41	1 1/2	2350	3 1/2 x 5	34x4 1/2	34x4 1/2	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl.

Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear.

*Tires—optional. †Pneumatic Tires. All others solid.

†Price includes body. ‡—Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Pump Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Pump Capacity	TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Pump Capacity		
All-In One	16-30	\$1975	3	Clim.	4-5 x 6 1/2	GDK	3-4	G-O	14-28	\$1485	4	Wauk.	4-4 1/2 x 5 1/2	G or K	3	Port Huron	12-25	\$1600	4	Chief	4-3 1/2 x 6	G,K	3		
Allis-Chalm. B	6-12	925	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2	Grain Belt	18-36	2150	4	Wauk.	4-4 1/2 x 6 1/2	G or K	4	Prairie Dog, L	9-18	650	3	Wauk.	4-3 1/2 x 5 1/2	Gas.	3		
Allis-Chalm. G.P.	6-12	795	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2	Gray	18-36	2000	3	Wauk.	4-4 1/2 x 6 1/2	Gas.	4	Prairie Dog, D	15-30	1250	4	Wauk.	4-4 1/2 x 6 1/2	Gas.	3		
Allis-Chalm. L	12-20	1350	2	Midw.	4-4 1/2 x 5 1/2	Gas.	2-3	Ground Hog	19-31	2000	4	Erd.	4-4 x 6	G or K	3	Ranger Cul.									
Allis-Chalm. M	18-30	2150	4	Own	4-4 1/2 x 6 1/2	G or K	3-4	Gt. Western St	20-30	1950	4	Beav.	4-4 1/2 x 6	K	4										
Allis-Chalm. N	10-18	875	4	Own	4-4 1/2 x 6 1/2	G,K	4	Hart-Parr	20	945	4	Own	2-5 1/2 x 6 1/2	K,D	2	Reed	8-16		4	LeR.	4-3 1/2 x 4 1/2	Gas.	1		
Allwork	14-28	1775	4	Own	4-4 1/2 x 6	G or K	3	Hart-Parr	30	1295	4	Own	2-6 1/2 x 7	K,D	3	Reed	15-30	1985	4	Wauk.	4-4 1/2 x 6 1/2	G or K	3-4		
Allwork	14-28	1525	4	Own	4-5 x 6	G or K	3	Heider	9-16	1170	4	Wauk.	4-4 1/2 x 6 1/2	G,K	2	Reliable	10-20	885	4	Own	2-6 x 7	Ker.	2		
Andrews	18-36	2500	4	Clim.	4-5 x 6	G or K	3	Heider	12-20	1395	4	Wauk.	4-4 1/2 x 6 1/2	G,K	3	Rex	12-25	1600	4	Wauk.	4-4 x 7	G or K	3		
Appleton	12-20	1500	4	Buda	4-4 1/2 x 5 1/2	G,K	2-3	Heider	6-10	1050	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1	Russell	12-24	1500	4	Own	4-4 1/2 x 5 1/2	G or K	2-3		
Aro	1921-22	495	4	Own	4-4 1/2 x 5	Gas.	1	Hicks	20-30		4		4-4 1/2 x 6	G or K	4	Russell	15-30	2200	4	Own	4-5 x 6 1/2	G or K	3-4		
Aultman-T.	15-30	2200	4	Clim.	4-5 x 6 1/2	G,K	4	Huber Light 4	12-25	1185	4	Wauk.	4-4 1/2 x 6 1/2	G or K	3	Russell	20-35	3000	4	Own	4-5 1/2 x 7	G or K	4-5		
Aultman-T.	22-45	3420	4	Own	4-5 1/2 x 8	G,K	6	Huber Super 4	15-30	1885	4	Midw.	4-4 1/2 x 6	Gas.	3	Russell	30-60	5000	4	Own	4-8 x 10	G or K	8-10		
Aultman-T.	30-60	4500	4	Own	4-7 x 9	G,K,D	8	Illinois, Super	18-30		4	Clim.	4-5 x 6 1/2	G,K	4	Samsen	10-20	1250	4	Nor	4-4 x 5 1/2	G,K	2		
Automot, B-3	12-24	1785	4	Herec.	4-4 x 5	Gas.	2-3	Imperial	40-70	4500	4	Own	4-7 1/2 x 9	G,K,D	10	Sandusky, J	15-35	1750	4	Own	4-4 1/2 x 5 1/2	G,K,D	2		
Avery, SR, Cul.	5-10		4	Own	4-3 x 4	G,K	2	Indiana	5-10	895	2	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2	Sandusky, E	15-35	1750	4	Own	4-5 x 6 1/2	G,K,D	4		
Avery, Cult-C	5-10		4	Own	6-3 x 4	G,K	2	International	8-16	900	4	Own	4-4 1/2 x 5	G,K,D	2	Shawnee Com.	6-12		2	LeR.	4-3 1/2 x 4 1/2	Gas.	1		
Avery	5-10		4	Own	6-3 x 4	G,K	2	International	15-30	1750	4	Own	5-4 x 6	G,K,D	4	Shawnee Com.	9-18		2	Gray	4-3 1/2 x 5	Gas.	1		
Avery	8-16		4	Own	2-5 1/2 x 6	G,K,D	2-3	J-T	20-40		2	Chief	4-4 1/2 x 6	G,K,D	3-4	Shelby	15-30		4	Beav.	4-4 1/2 x 6	G,K	3		
Avery	12-20		4	Own	4-4 1/2 x 6	G,K,D	2-3	Klumb	16-32	1475	4	Clim.	4-5 x 6 1/2	Gas.	4-6	Shelby	10-20		4	Erd.	4-4 x 6	G or K	2-3		
Avery	12-25		4	Own	2-6 1/2 x 7	G,K,D	3-4	Knudsen	1920	25-45	2500	4	Own	4-5 x 9	Gas.	4-6	Short Turn	20-40	1500	3	Beav.	4-4 1/2 x 6	G,K	3	
Avery	14-28		4	Own	4-4 1/2 x 6	G,K,D	3-4	LaCrosse	6-12	650	4	Own	2-4 x 6	G,K	1	Square T	18-35	2075	3	Clim.	4-5 x 6 1/2	G,K	3		
Avery	18-36		4	Own	4-5 1/2 x 6	G,K,D	4-5	LaCrosse	12-24	985	4	Own	2-6 x 7	G or K	3	Steady Pull	12-24	1485	4		4-4 x 5	Gas.	3		
Avery	25-50		4	Own	4-6 1/2 x 7	G,K,D	8-10	Lauson	5	12-25	1495	4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Stinson	18-36	1835	4	Beav.	4-4 1/2 x 6	G,K	4	
Bates	15-25		4	Own	4-4 1/2 x 6	Ker.	3	Lauson	20	15-25	1685	4	Beav.	4-4 1/2 x 6	G or K	3-4	Stone	20-40	2250	4	Beav.	4-4 1/2 x 6	G,K	4	
Bates Mule, H	15-25		4	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Lauson	21	15-30	1985	4	Beav.	4-4 1/2 x 6	G or K	3-4	Tioga	15-27	2625	4	Wisc.	4-4 1/2 x 6	Gas.	3-4	
Bates Mule, F	18-25		2	Midw.	4-4 1/2 x 5 1/2	Gas.	3	Lauson Road	15-30	2225	4	Beav.	4-4 1/2 x 6	K	4	Titan	10-20	900	4	Own	2-6 1/2 x 8	G,K,D	3		
Bates Mule, G	25-35		2	Midw.	4-4 1/2 x 6	Gas.	com.	Leader	12-18	1095	4	Own	2-6 x 6 1/2	G,K,D	2-3	Topp	30-45	3500	4	Wauk.	4-4 1/2 x 6 1/2	Gas.	3-4		
Bea.	8-16		1	Own	4-3 1/2 x 4	G,K	2-3	Leader	16-32	1985	4	Clim.	4-5 x 6 1/2	G,K	3-4	Toro Cultivator	6-10		3	LeR.	4-3 1/2 x 4 1/2	Gas.	2		
Beeman, G	2-4	315	4	Own	1-3 1/2 x 4 1/2	Gas.		Leader	18-35	2775	2	Clim.	4-5 x 6 1/2	G,K	3-4	Townsend	10-20	895	2	Own	4-6 1/2 x 7	Ker.	2-3		
Best	30	3100	2	Own	4-4 1/2 x 6 1/2	G,K,D	4	Leader	18-35	2775	2	Clim.	4-5 x 6 1/2	G,K	3-4	Townsend	15-30	1485	2	Own	4-7 x 8	Ker.	3-4		
Best	60	5450	2	Own	4-6 1/2 x 8 1/2	G,K,D	8-9	Leonard	20-30	2630	4	Buda	4-4 1/2 x 6	G,K	3	Townsend	25-50	2750	2	Own	4-8 x 10	Ker.	4-8		
Boring	1921	1850	3	Wauk.	4-4 1/2 x 5 1/2	G or K	2	Liberty	18-32	2475	4	Clim.	4-4 1/2 x 6	G,K	4	Traction Motor	40-50		4		8-3 1/2 x 5	Gas.	4-5		
Burn-Oil, 1921	15-30	1650	4	Own	2-6 1/2 x 7	Ker.	3-4	Linn	40	4500		Cont.	4-4 1/2 x 6 1/2	Gas.	4	Traylor	10-20	715	4	LeR.	4-3 1/2 x 4 1/2	Gas.	1-2		
Capital	15-30	1000	2	Own	4-4 1/2 x 6	Gas.	3	Linn	W	60	5100	4	Wauk.	4-5 x 6 1/2	K	6	Triumph	18-36	2450	2	Erd.	4-4 1/2 x 6	Ker.	4	
Case	10-18	800	4	Own	4-3 1/2 x 5	G or K	2	Little Giant, B	16-22	2200	4	Own	4-4 1/2 x 5	K	4	Turnar	10-25	3750	2	Wauk.	4-5 x 6 1/2	G or K	4		
Case	15-27	1680	4	Own	4-4 1/2 x 6	G or K	3	Little Giant, A	26-35	3300	4	Own	4-5 1/2 x 6	K	6	Turner	14-25	1295	4	Buda	4-4 1/2 x 5 1/2	G,K	3		
Case	22-40	3100	4	Own	4-5 1/2 x 6 1/2	G or K	4-5	Lombard	1921	85-150		2	6-5 1/2 x 6 1/2	Gas.	16	Twin City	12-20	1580	4	Own	4-4 1/2 x 6	G,K	3		
Caterpillar T11	25	3975	2	Own	4-4 1/2 x 6	Gas.	4	Lombard	1921	50		2	4-4 1/2 x 6 1/2	Gas.	6-10	Twin City	20-35	3175	4	Own	4-5 1/2 x 6 1/2	G,K	5		
Caterpillar T16	40	6050	2	Own	4-6 1/2 x 7	G or K	6	Magnet	18-28	1875	4	Wauk.	4-4 1/2 x 6 1/2	K&G	3	Twin City	40-65	5250	4	Own	4-7 1/2 x 9	G,K	8		
Centaur	5-12 1/2	385	2	N Way	2-4 1/2 x 4 1/2	G or K	1	Master Jr	5-10	585		LeR.	2-2 1/2 x 4	Gas.	1	Uncle Sam C20	12-20	1385	4	Weid.	4-4 x 5 1/2	G	2-3		
Chase	6-25	1725	3	Buda	4-4 1/2 x 5 1/2	G or K	2-3	Merry Gar	1921	2	230	2	Evlin	1-2 1/2 x 2 1/2	Gas.	1	Uncle Sam B19	20-30	2300	4	Beav.	4-4 1/2 x 6	G or K	3-4	
Cletrac	40	2500	4	Own	4-4 1/2 x 6	Gas.	4	Minne.	12-25	1200	4	Own	4-4 1/2 x 7	G or K	3	Uncle Sam D21	20-30	1985	4	Beav.	4-4 1/2 x 6	G or K	3-4		
Cletrac	W	9-16	815	2	Own	4-3 1/2 x 4 1/2	G,K,D	2	Minne. Gen-P	17-30	1850	4	Own	4-4 1/2 x 7	G or K	3-4	Universal	1-4	475	2	Own	1-3 1/2 x 5	G	1	
Cletrac	W	12-20	1495	2	Own	4-4 x 5 1/2	G,K,D	2-3	Minne.			4	Own	4-4 1/2 x 7	G or K	3-4	Utilitor	501	2 1/2	4	Own	1-3 1/2 x 4 1/2	G	1	
Dakota	4	15-27	1500	3	Dom.	4-4 1/2 x 6	Gas.	3	Med.Duty	22-44	3300	4	Own	4-6 x 7	G or K	5-6	Victory	1921	9-18	1350	4	Gray	4-3 1/2 x 5	Gas.	2
Dart	B.J.	15-30	1800	4	Buda	4-4 1/2 x 6	Gas.	3-4	Minne.			4	Own	4-7 1/2 x 9	G or K	8-9	Victory	1921	15-30	1750	4	Wauk.	4-4 1/2 x 5 1/2	Gas.	3
Depue	A	20-30	2500	4	Buda	4-4 1/2 x 6	Gas.	4	Heavy Duty	35-70	4600	4	Own	4-7 1/2 x 9	G or K	8-9	Vim	15-30	1650	4	Wauk.	4-4 1/2 x 5 1/2	G,K	3	
Dill	D	20	2380	4	Cont.	4-4 1/2 x 5 1/2	Gas.	3	Mohawk	1921	8-16	785	2	Light	4-3 1/2 x 4 1/2	G or K	2-3	Wallis	15-25	1600	4	Own	4-4 1/2 x 5 1/2	G,K	3
Do-It-All	A	3-6	595	1	Own	1-4 1/2 x 5	Gas.	1	Moline Univ D	9-18	990	2	Own	4-3 1/2 x 5	G or K	1	Waterloo	N	12-25	1450	4	Own	2-6 1/2 x 7	G,K	3
Eagle	F	16-30		4	Own	2-7 x 8	G or K	3-4	Moline Orch.	9-18	1075	2	Own	4-3 1/2 x 5	Gas.	2-3	Webfoot	53	25-35	5000	2	Wisc.	4-5 1/2 x 7	G,D	6
E-B	AA	12-20	1445	4	Own	2-8 x 8	G or K	4-5	Motor Macult.	1 1/2	195	2	Own	1-2 1/2 x 3 1/2	Gas.	1	Wellington	F	16-30		4	Chief	4-4 1/2 x 6	Ker.	2-3
E-B	Q	12-20	925	4	Own	4-4 1/2 x 5	G,K,D	3	Metox	15-30	2250	4	Buda	4-4 1/2 x 6	Gas.	3-4	Wellington	1920	16-32	2100	4	Clim.	4-5 x 6 1/2	Gas.	4
E-B		16-32	2080	4	Own	4-5 1/2 x 7	G,K,D	4	NB	3-6	425	4	Own	2-3 1/2 x 4	Gas.	1	Wetmore		12-25	1650	4	Wauk.	4-4 x 5 1/2	G,K	3
Erans	18-30	2000	4	Buda	4-4 1/2 x 6	G,K	3	Nichols-Shep.	23-32	20-42	3100	4	Own	8 x 10	G or K	3-6	Wharton	E	12-20	1800	3	Buda	4-4 1/2 x 5 1/2	Gas.	2
Fagool	D	9-12	1525	4	Lyc.	4-3 1/2 x 5	Gas.	2	Nichols-Shep.	25-50	3460	4	Own	8 x 12	G or K	4-7	Waitney		9-18		4	Own	2-5 1/2 x 6 1/2	Gas.	2
Farm Horse	B	18-30	1885	4	Clim.	4-5 x 6 1/2	G,K	3-4	Nilson Senior	20-40	2475	5	Wauk.	4-5 x 6 1/2	G,K	4	Wichita	T	15-30	2000	4	Beav.	4-4 1/2 x 6	G,K,D	3-4
Farquhar		15-25		4	Buda	4-4 1/2 x 6	G,K,D	3-4	Oil Pull	K	12-20	1485	4	Own	2-6 x 8	K,D	3	Wisconsin E	16-30	2250	4	Clim.	4-5 x 6 1/2	G or K	3
Farquhar		18-35		4	Own	4-6 x 8	G,K,D	4-5	Oil Pull	H	16-30	2285	4	Own	2-7 x 8 1/2	K,D	4	Wisconsin F	20-40	2150	4	Wauk.	4-5 x 6 1/2	G or K	4
Farquhar		25-50		4	Own	4-7 x 8	G,K,D	4-5	Oil Pull	G	20-10	3175	4	Own	2-8 x 10	K,D									

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Little Rock, Ark.	Little Rock Automobile Dealers' Assn.	Nov. 11-19
New York	Closed Body Exhibition	Nov. 14-19
Jersey City	Second Annual Show	Nov. 14-19
Chicago	Automotive Equipment Show	Nov. 14-19
Cincinnati	Automotive Equipment Exposition	Nov. 26-Dec. 3
New York	Automobile Salon	Nov. 27-Dec. 3
London, Ontario	National Motor Show of Western Canada	January
New York	National Automobile Show	Jan. 7-13
Buffalo	Buffalo Automobile Dealers' Assn.	Jan. 14-21
Tulsa, Okla.	Automobile Show	Jan. 16-21
Oakland, Calif.	Automobile Show	Jan. 16-22
Milwaukee	Fourteenth Annual Automobile Show	Jan. 19-25
Cleveland	Cleveland Automobile Mfrs. and Dealers' Assn.	Jan. 21-28
Portland, Ore.	Annual Automobile Show	Jan. 23-29
Chicago	National Automobile Show	Jan. 28-Feb. 3
Chicago	Automobile Salon	Jan. 28-Feb. 3
Minneapolis	Tractor Show	Feb. 6-11
Minneapolis	Automobile Show	Feb. 6-11
Winnipeg, Canada	Canadian Automotive Equipment Assn. Show	Feb. 6-11
Kansas City	Kansas City Motor Car Dealers' Assn.	Feb. 9-16
Atlanta	Southern Automobile Show	Feb. 11-18
San Francisco	Sixth Annual Pacific Automobile Show	Feb. 11-18
Louisville, Ky.	Fourteenth Annual Automobile Show	Feb. 20-25
Syracuse	Fourteenth Annual Automobile Show	Feb. 20-25
Des Moines	Winter Automobile Show	Feb. 26-March 3
Springfield, Mass.	Seventh Annual Automobile Show	Feb. 27-March 4
Brooklyn	Eleventh Annual Show	March 4-11
Boston	Annual Automobile Show	March 11-18
Newark, N. J.	Newark Automobile Dealers' Assn.	March 11-18

RACES

Los Angeles	Speedway Race	Nov. 24
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FOREIGN SHOWS

Olympia, England	Automobile Show	Nov. 3-12
London	British Motor Show, Motor Mfgs. and Traders	Nov. 4-11
Paris	Aviation Exhibition	Nov. 12-27
Shanghai, China	Automobile Show	Nov. 26-Dec. 3
Santiago, Cuba	Annual Automobile Show	March, 1922
Rio de Janeiro, Brazil	Automotive Exhibition	September, 1922

CONVENTIONS

Cleveland	National Tire Dealers' Association	November
Chicago	Annual Meeting and Business Exhibits of Automobile Equipment Assn.	Nov. 14-19
Chicago	Research Club Convention	Nov. 14
New York	Factory Service Managers' Convention	Nov. 15-16
Indianapolis	Indiana Automotive Trade Assn. Convention	Nov. 16-17
Columbus, O.	Ohio Automotive Trade Assn. Meeting	Dec. 12-14
Chicago	American Road Builders' Convention and Show	Jan. 17-20
Chicago	Fifth Annual N. A. D. A. Convention	Jan. 30-31

DAY-ELDER REDUCES PRICES

Newark, Nov. 8—Day-Elder Motors Corp. makes reduction ranging as high as \$500 in the prices of its truck models. The list follows:

	Old Price	New Price
Model A, 1-ton	\$2100	\$1600
Model B, 1½-ton	2300	2000
Model D, 2-ton	2750	2400
Model C, 2½-ton	3025	2750
Model F, 3½-ton	3750	3150
Model E, 5-ton	4250	4250

RODMAN WINS LOVING CUP

Fort Wayne, Ind., Nov. 5—At a meeting of sales managers of the Wayne Oil Tank & Pump Co. recently held in this city, a silver loving cup was presented to L. G. Rodman of San Francisco, as the prize in a sales contest. The meeting was the annual conference of the

company's district sales managers. This concern is exceedingly optimistic over the outlook for business during the coming year.

NEW ARMLEDER MODEL

Cincinnati, Nov. 5—The O. Armleder Co. is bringing out a new model 30 with a capacity of 1½ tons. This will fit in the line between the present model 20 and model HW. The engine is a Buda, 3¾ by 5½ in., wheelbase 147 in., and final drive by Timken worm type axle. Prices have not as yet been announced.

COUNTY DEALERS ORGANIZE

New Albany, Ind., Nov. 5—Automotive dealers of this country have decided to form an automotive dealer association. Oct. 12 was set as the date for a general meeting for organization purposes.

Dealers' Assn. Draws Line Between Cash and Credit

Plan Adopted for Payment of Service Bills Results in Compromise in Galesburg, Ill.

GALESBURG, Ill., Nov. 7—At the regular meeting of the Galesburg Automobile Dealers' Assn., a spirited discussion took place in relation to the suggestion of abandoning a credit business and, in the future, selling only for cash. There was a division of opinion, some favoring a strictly cash business for all storage, repair and accessories, while others were opposed, insisting that a large majority of their patrons were persons who preferred to pay their accounts monthly and to whom any other system would be a great inconvenience.

It was brought out in the discussion that Knox county automotive patrons have a very good record for payment of bills and that the sum lost because of bad debts was very small. After the question had been talked over pro and con, a compromise decision was reached, which was, in effect, that a credit of 30 days only be granted to responsible persons who had always paid their bills promptly in the past, while cash would be required of all others. It was further decided that all patrons, whether paying cash or being allowed credit, would be required to approve their repair bills before driving the car away. It was also voted to compile a list of all persons prone to issue worthless checks; those unusually slow in paying their bills, and those with a reputation for perpetual and unjust fault-finding in relation to charges for repair work. This list will be present in every garage so that proprietors will know whose business is desirable, and otherwise.

It was emphasized during the discussion that it was the desire of the dealers of Galesburg to place the automotive business upon a clean-cut, substantial foundation, trimming all unnecessary expenses and reducing overhead. Instead of seeking a large volume of business, they would cater to the better class of sure pay, reasonable patrons, and, at the same time, eschew the undesirable class, whose unprofitable business had to be supported by the other type who pay their obligations when due and who are entitled to the best possible service and consideration.

It was maintained that special consideration should be given to the man temporarily embarrassed who shows the right intentions, but the patronage of persons who ignore statements, or who have not the means or are inclined to invest beyond their ability to pay should be discouraged.

WALTER TRUCK LOWERS PRICE

New York, Nov. 7—The Walter Motor Truck Co. has reduced the price of its 5-ton model from \$5600 to \$4850.